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As one of its major activities in carrying out its purpose, the Society publishes a monthly magazine, *Canadian Geographical Journal*, which is devoted to every phase of geography — historical, physical, and economic — first of Canada, then of the British Empire and of the other parts of the world in which Canada has special interest. It is the intention to publish articles in this magazine that will be popular in character, easily read, well illustrated and educational to the young as well as informative to the adult.

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Published monthly by THE CANADIAN GEOGRAPHICAL SOCIETY

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Gordon M. Dallyn

This magazine is dedicated to the interpretation, in authentic and popular form, with extensive illustration, of geography in its widest sense, first of Canada, then of the rest of the British Commonwealth, and other parts of the world in which Canada has special interest.

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(Photo by Mrs. Don Munday)

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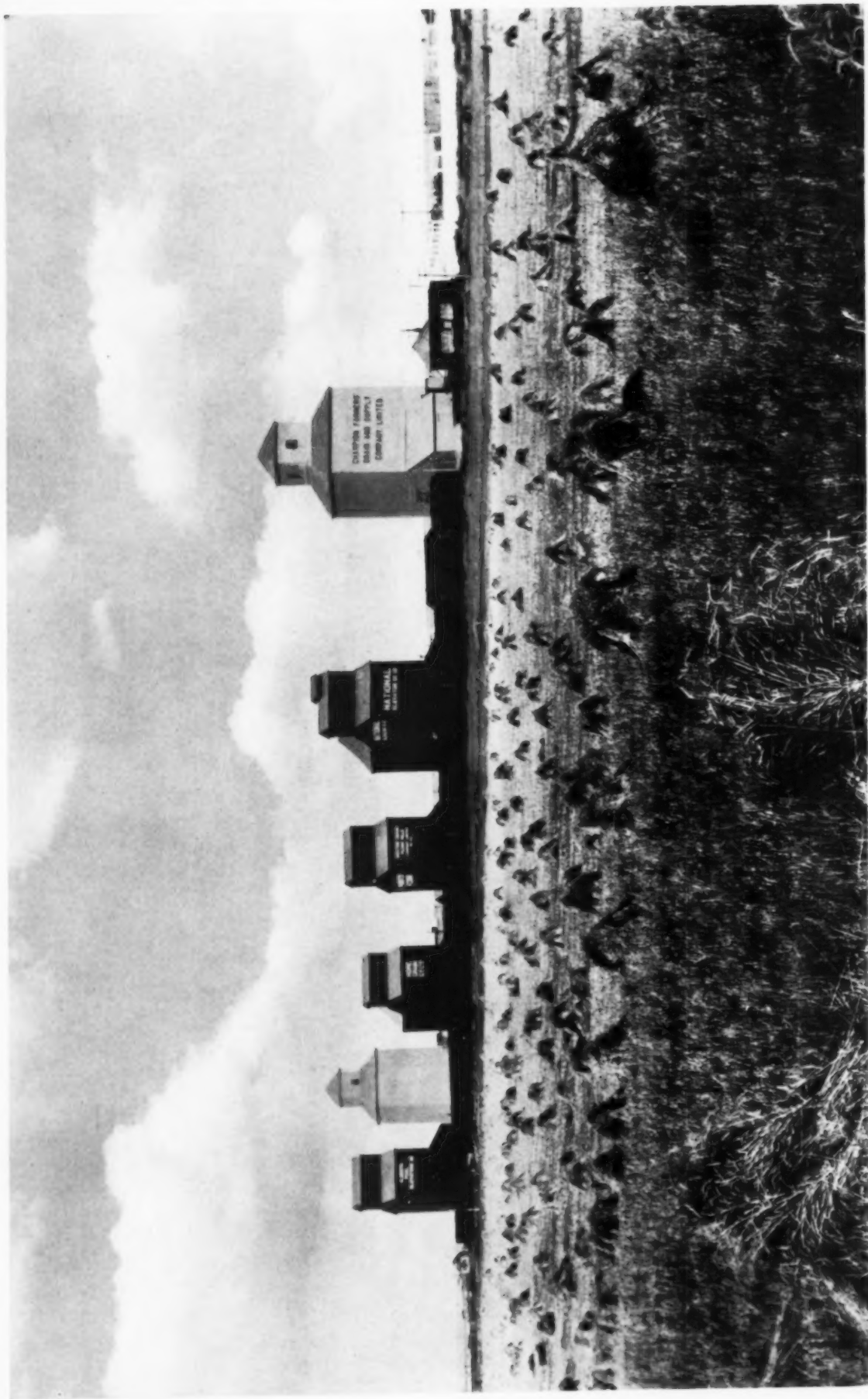
The British standard of spelling is adopted substantially as used by the Dominion Government and taught in most Canadian schools, the precise authority being the Oxford Dictionary as edited in 1929.

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CGMPB

Note grain fields surrounding elevators; —freight cars stored waiting for new grain to start on its long trip to flour mills in the United Kingdom, Europe, etc.

GRAIN TRANSPORTATION IN CANADA

by G. S. WRONG and W. DOUGAN

CANADA is the chief exporter of wheat in the world. Only twice in the last ten years have her wheat exports been exceeded by any other country, and that was by Argentina in the crop years 1929-30 and 1934-35. In point of value, wheat holds first place in the list of Canada's exports.

The variety of the types of wheat produced is one of the chief reasons for Canada's prominence as an exporter. Marquis wheat is known for its hard texture and wheat of such a texture is required to mix with that of a softer nature, in order to make a blend of flour which appeals to the consumer in the British Isles, Canada's chief importer.

Practically all the wheat is produced in the three prairie provinces of Manitoba, Saskatchewan and Alberta, the grain area being about 800 miles from east to west and 400 miles from north to south. Winnipeg, on the eastern limit of this wheat area, is 420 miles from the head of navigation on Lake Superior, which is 1,200 miles by water from Montreal, and Calgary, on the western limit, is 640 miles from Vancouver.

It is quite evident from the above that transportation to the seaboard ports for export, or to the principal Canadian markets in Ontario, Quebec and the Maritime Provinces is a real problem.

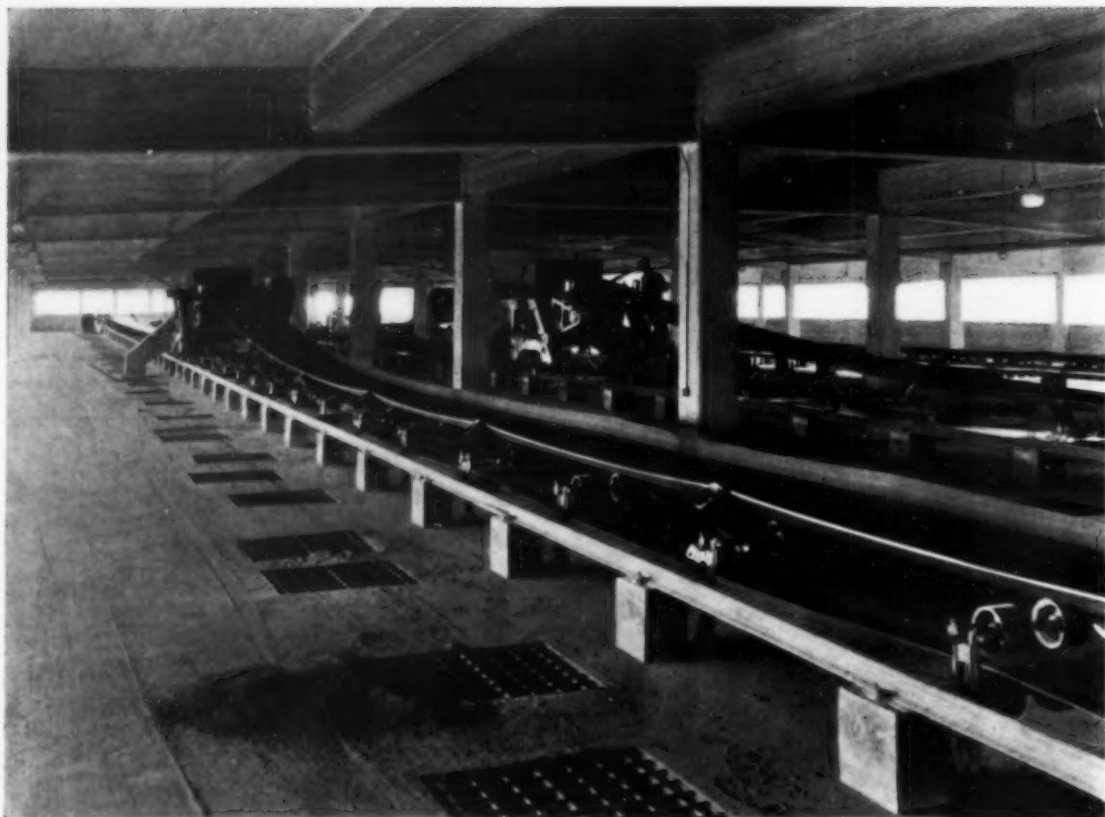
Prior to 1920, practically all of the western grain shipments were eastward through Fort William and Port Arthur, at the head of Lake Superior, and from there by boat to Montreal or other St. Lawrence River ports, or by boat to Georgian Bay and Lake Erie ports for furtherance by rail to Montreal or by rail or canal to New York or other United States ports. During the last five years the average quantity exported from the St. Lawrence and Maritime ports was 75 million bushels, while the amount routed via the United States Atlantic ports was 57 million bushels. The Panama Canal having been opened to commercial navigation, a trial shipment of wheat was forwarded from Vancouver to Great Britain in 1920. No "heating" or other shipping trouble developed, and this route rapidly grew into favour

for overseas shipments from as far east as the Alberta-Saskatchewan boundary, and shipments through the Pacific ports are now almost equal to those through the eastern Canadian ports.

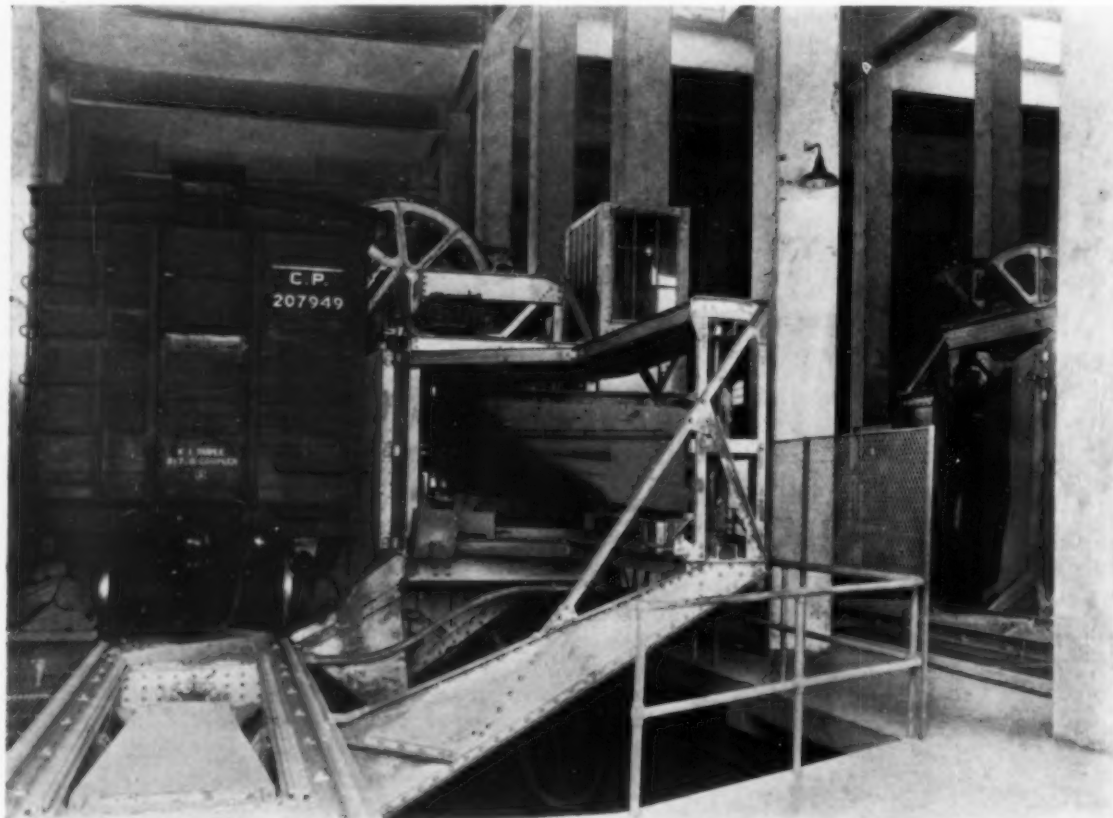
The harvesting time for grain throughout these Prairie Provinces is very short, and the grain is threshed as soon after it is cut as the weather and equipment will allow. In recent years the use of the combine, a machine which cuts and threshes grain in one operation, has increased rapidly. It is evident that, with a wheat crop ranging from 270 million to 545 million bushels, not to mention 172 to 254 million bushels of oats, 44 to 109 million bushels of barley, 3 to 20 million bushels of rye and $\frac{1}{2}$ million to 4 million bushels of flaxseed, all ripening within a few weeks' time, the grain must be moved promptly from the farms where there are practically no storage facilities.

The first leg of the movement is to the country elevators by wagon and motor truck. The distances, of course, vary, but hauls of 20 to 40 miles are not uncommon. Practically all the grain is handled loose all the way from the farm to the flour mills, and only occasionally is any bagged. The elevators, which are mainly storage bins, derive their name from the operation of elevating, or raising the grain from the wagons or ground floor to the top of the structure by chain belts to which are attached metal pockets. At the top or bin floor, the grain is conveyed by broad canvas belts to the proper bins. There are 5,729 of these country elevators in the western wheat area with a combined capacity of 190 million bushels. They are operated by stock companies and co-operative organizations of grain growers, and they form the first link in the series of storage facilities stretching across the country from the Atlantic to the Pacific.

These country elevators must be kept cleared or blockades would soon occur, and while the rush is on, chiefly from August to December, the railways are extended to the limit of their abilities hauling the grain to interior terminal elevators at the larger centres, such as Winnipeg, Saskatoon, Moose Jaw, Calgary and Edmonton, and



Canvas belts conveying grain from one bin to another. The grain is going from right to left and is being dumped into spouts leading to bins below.



Grain car dumps. The car is tilted to the left and the grain is poured out the side door of the car through the grating shown in the left foreground. A second dump is shown on the right.

then to the terminal elevators at Fort William and Port Arthur at the Head of the Lakes, and to Vancouver and other ports on the Pacific Coast.

These terminal elevators have enormous storage capacities. Those at the Head of the Lakes alone have a capacity of 93 million bushels. Grain is loaded loose into the railway box cars with capacities averaging 1,400 bushels or around 85,000 pounds. During the height of the shipping season, whole trains of grain are moved from Winnipeg to the Head of the Lakes averaging 80 to 100 cars, and the empty cars are hurried back for other loads as fast as the crews can handle them. Early in the summer the railway officials estimate the requirements for each station and the number of cars to be stored at each point to take care of the first shipments. In years of large harvest, every available car that is sound and fit for grain transport is pressed into service.

The grain is inspected and graded by Dominion Government officials at inspection points, the principal ones being Winnipeg, Moose Jaw, Saskatoon, Calgary and Edmonton. It is then stored in bins in the terminal elevators at the Head of the Lakes or in the Pacific Coast elevators, according to the grading. The majority of the terminal elevators have boat berths along their water front, and the grain is poured through spouts into the holds of the waiting boats. The decks of the grain boats on the Great Lakes are a series of hatches so that several streams of grain may be poured at the same time. The record rate of loading at Fort William and Port Arthur is 75,680 bushels per hour. The largest grain boat on the Great Lakes, the Lemoyne, is 621 feet long, and her largest cargo was 605,000 bushels of wheat. If this cargo had been loaded into railway cars, it would have made a train about four miles long.

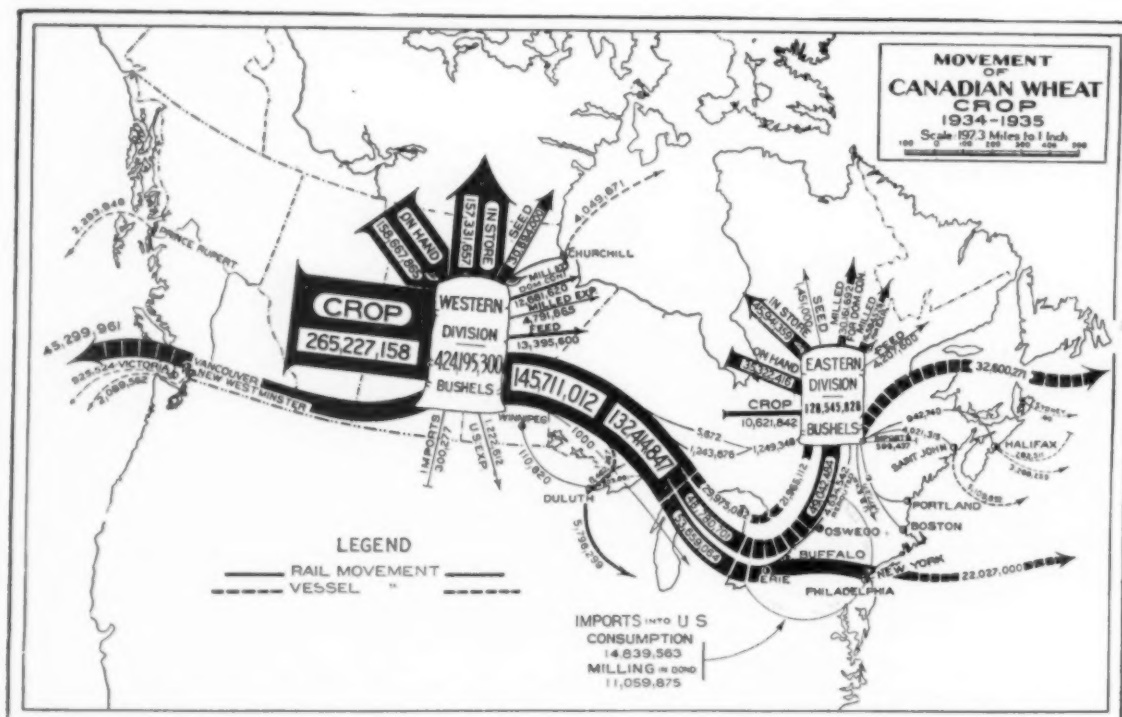
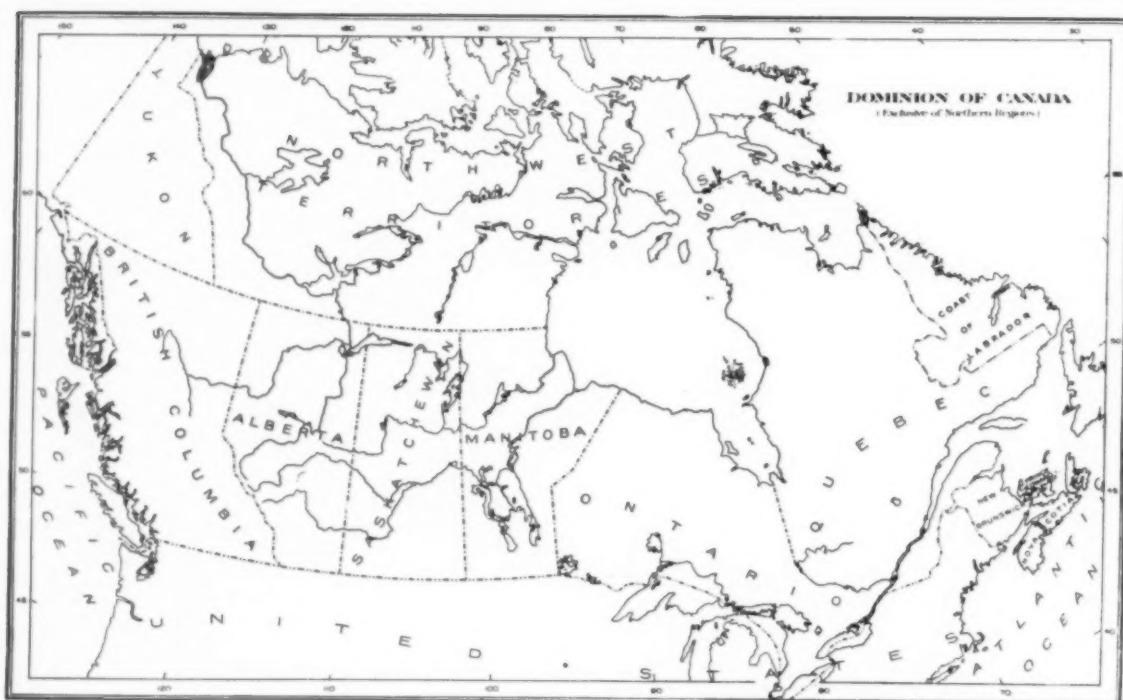
Only a relatively small quantity of export wheat is shipped eastward all the way to the Atlantic ports by railway, as the cost of transportation by boat is so much cheaper. The rate from Fort William or Port Arthur to Montreal, a distance of 1,200 miles, was only 4½ cents per bushel last year by boat. This works out at 0.122 cents per ton-mile against an average of over half a cent per ton-mile by railway. The unloading and loading of boats is also much easier and cheaper than of railway cars, although the unloading of

freight cars is remarkably quick. Two methods are generally used for discharging cars. A large wooden scoop — really just a wooden door — is pulled forward by a rope attached to a winch and then pulled back by two men. This draws the grain to the door of the box car, where it falls through a grating in the shed into hoppers below. The other method is to place the box car in a dump or unloading cradle, which tips the car sideways and the grain pours out of the door. When boats are being unloaded, grain is sucked up through spouts into the elevators.

The draught allowed through the St. Lawrence canals between Lake Ontario and Montreal is only 14 feet, whereas it is 21 feet for Upper Lake boats. Consequently these boats must transfer their cargoes for export through lower St. Lawrence ports to craft of shallower draught. Before the completion of the Welland Ship Canal in 1932, the bulk of the transfers were made at Port Colborne, at the Head of the Welland Canal, where the Dominion Government operated an elevator constructed primarily for the purpose. Now, however, the new canal with locks 859 feet long and 30 feet deep will pass the largest of the grain boats. Transfers are also made now at the Dominion Government elevator at Prescott and at private elevators at Toronto, Kingston and other ports on Lake Ontario. At Port Colborne grain can be unloaded and reloaded into smaller boats at a rate of around 60 thousand bushels per hour.

There are three outlets that grain can take in order to reach its final overseas destination. First, it may go by the all-Canadian eastern route, secondly, by the United-States Atlantic seaboard ports, and thirdly, by the all-Canadian Pacific coast route. During the last five years a limited quantity of grain has been shipped overseas through Churchill, on Hudson Bay, the amount exported last year being four million bushels.

Grain passing along the all-Canadian eastern route from the Head of the Lakes may go by lake vessel to Georgian Bay and Lake Huron ports (Port McNicoll, Midland, Tiffin, Owen Sound, Collingwood, Goderich and Sarnia) and by rail to Montreal, Sorel, Three Rivers and Quebec, or the Canadian seaboard ports of Saint John and Halifax; or it may go to the Lower Lake Ports (Port Colborne, Toronto, Kingston and Prescott), and thence by



vessel or rail to Montreal, Sorel, Three Rivers, or Quebec, or on to Canadian seaboard ports by rail.

The Canadian grain movement via United States ports is from the Head of the Lakes (Fort William and Port Arthur) to Buffalo, thence by the New York State barge canal to Albany or New York, or by rail to the United States Atlantic seaboard ports of Portland, Boston, New York, Baltimore, Philadelphia and Norfolk. Up to the crop year 1924-25, this route handled a large percentage of the Canadian export grain, but since that time there has been a decided change to the all-Canadian eastern route. A small movement of Canadian grain is also shipped in bond from the Prairie Provinces through the United States Lake Superior ports of Duluth and Superior, and thence by boat to Montreal and other eastern ports.

Normally, almost all the grain exported by the eastern routes during the season of navigation on the Great Lakes and St. Lawrence moves by the all-water route from the Head of the Lakes to Montreal, Sorel or Quebec; or by the Lakes to Buffalo, and thence by the New York State barge canal to New York. After the close of navigation on inland waters, grain stored at the Georgian Bay ports is moved by rail to Saint John or Halifax, while grain stored at Buffalo moves by rail to New York or other United States Atlantic seaports.

Transportation costs on the two all-water routes to Montreal or New York are kept in close correspondence by competition, while the Canadian railways keep the cost of rail movement from the Georgian Bay ports to Saint John and Halifax on a parity with the cost of movement by rail from Buffalo to New York City. Normally, grain does not move by rail to Atlantic ports while water routes are open.

In the case of exports of grain through the ports of Vancouver, Prince Rupert, Victoria and New Westminster, the grain is shipped by rail to the above ports and unloaded into the elevators for shipment by vessel to ports in the Orient or via the

Panama Canal to the United Kingdom or Continental Europe.

The movement of United States grain via Canadian ports during the last ten years has been considerable and, of course, has varied in quantity from year to year. During the crop year 1921-22, more United States grain than Canadian was shipped through the Port of Montreal.

The United States harvest is a month earlier than the Canadian, and United States shippers take advantage of the lake grain shipping facilities, which are available at this particular time. The movement of Canadian grain to the eastern elevators has not then commenced, and storage space is at a maximum, which makes it convenient to handle the United States grain with despatch. This grain, in passing through Eastern Canada, moves from the United States upper lake ports of Chicago, Duluth and Milwaukee by vessel to Canadian Lake Huron and Georgian Bay ports, or to Montreal, Sorel, Three Rivers, and Quebec. From the latter ports it is reloaded into ocean vessels for overseas countries. United States grain arriving at Lake Huron and Georgian ports is shipped by rail to Montreal and other Canadian seaports, or to the United States seaboard. The greater part of the grain in the past has gone to Montreal for export overseas. It will thus be seen that the bulk of the United States grain passing through Canada is handled twice in Canadian elevators, first on its entry at the Canadian lake ports, and again at the ports of Montreal, Sorel, Three Rivers, Quebec, Saint John and Halifax.

As in the case of Canadian grain, the movement of United States grain to date through Canada is chiefly via Montreal, Sorel and Quebec during the season of open inland navigation, and in winter by rail via Saint John and Halifax.

Since 1932, the United States, owing to severe drought conditions, have had reduced crops, with the result that only a very small amount was exported, which decreased the movement of grain through Canada. During the crop year 1935-36, only 7,000,000 bushels of United States grain passed through Canada.



Wagon loaded with grain hauled by tractor to country elevator. Note supply of gasoline on top of load.



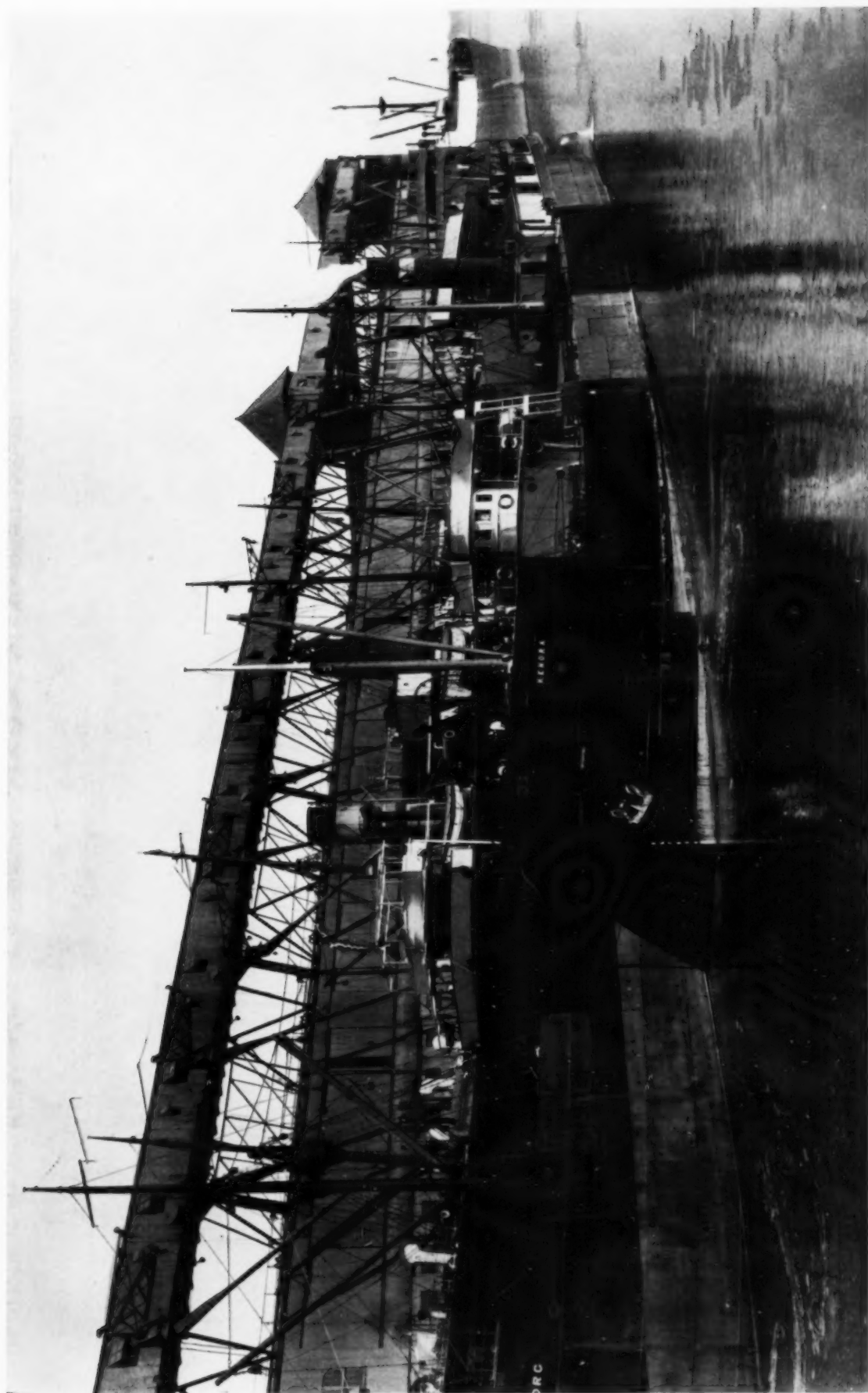
Motor trucks and wagons waiting to unload grain at country elevators. Note proportion of the wagons to trucks. Hay on top for horses during their long trip in and out. The grain is taken from wagons and trucks on one side of elevator and loaded into railway box cars on the other side.



Note row of elevators each operated by a different company or organization.



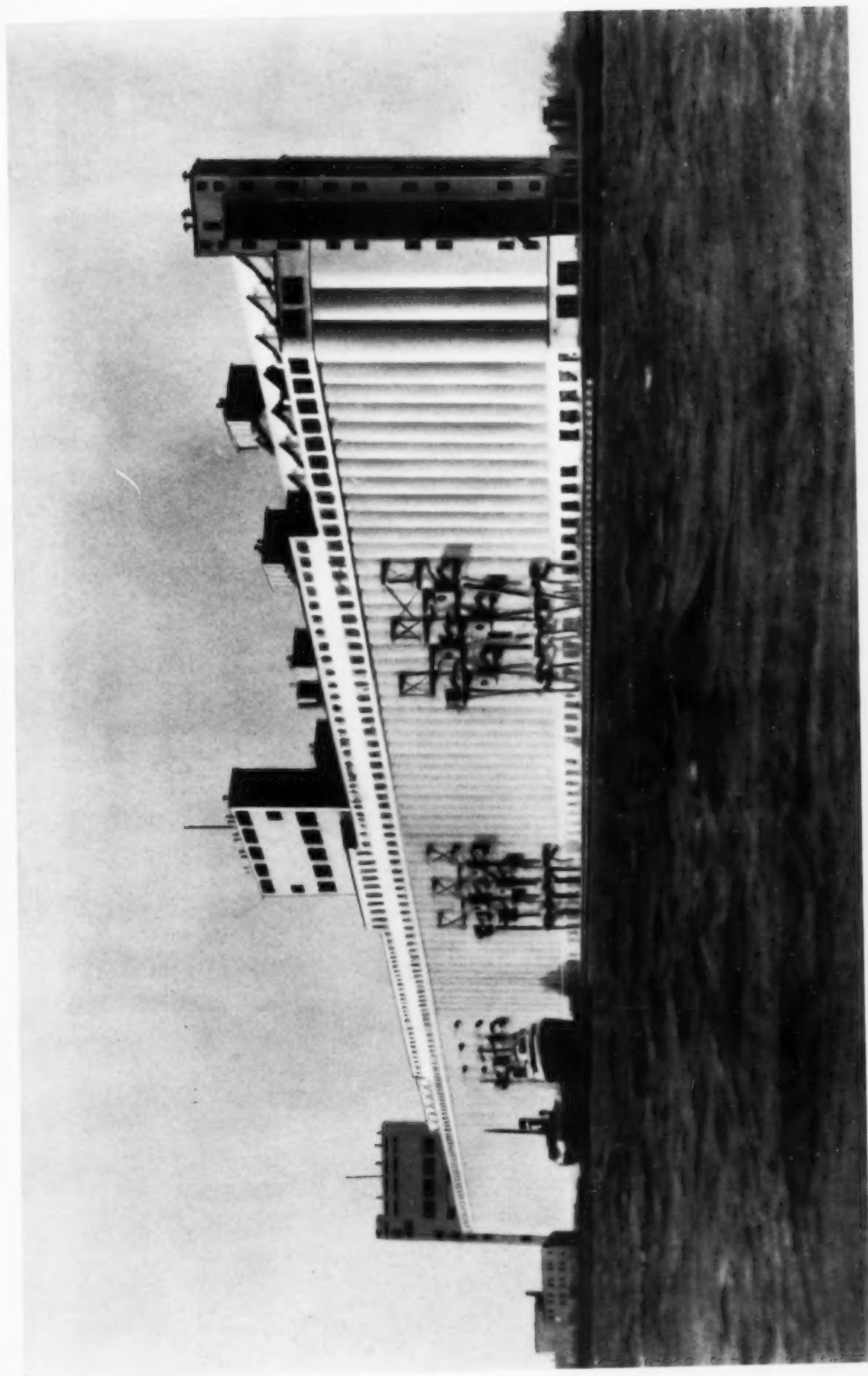
Levelling off grain on an ocean steamship at Vancouver. Note the stream of grain pouring out of the spout from the Elevator.



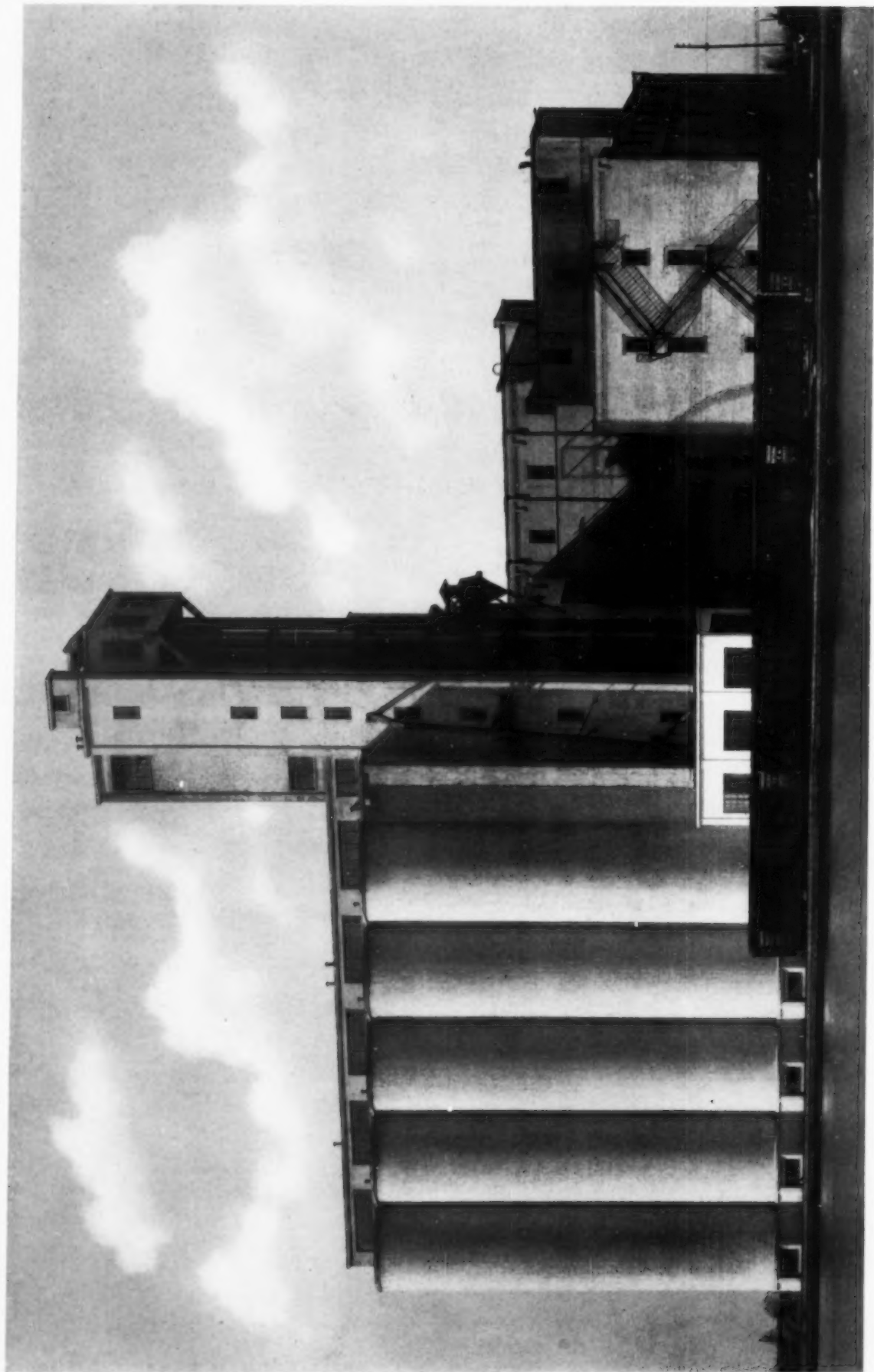
Loading into ocean boats at Montreal. Occasionally Montreal harbour becomes congested with lake boats waiting to unload grain and ocean boats waiting to take on cargoes despite the extensive unloading and loading facilities.



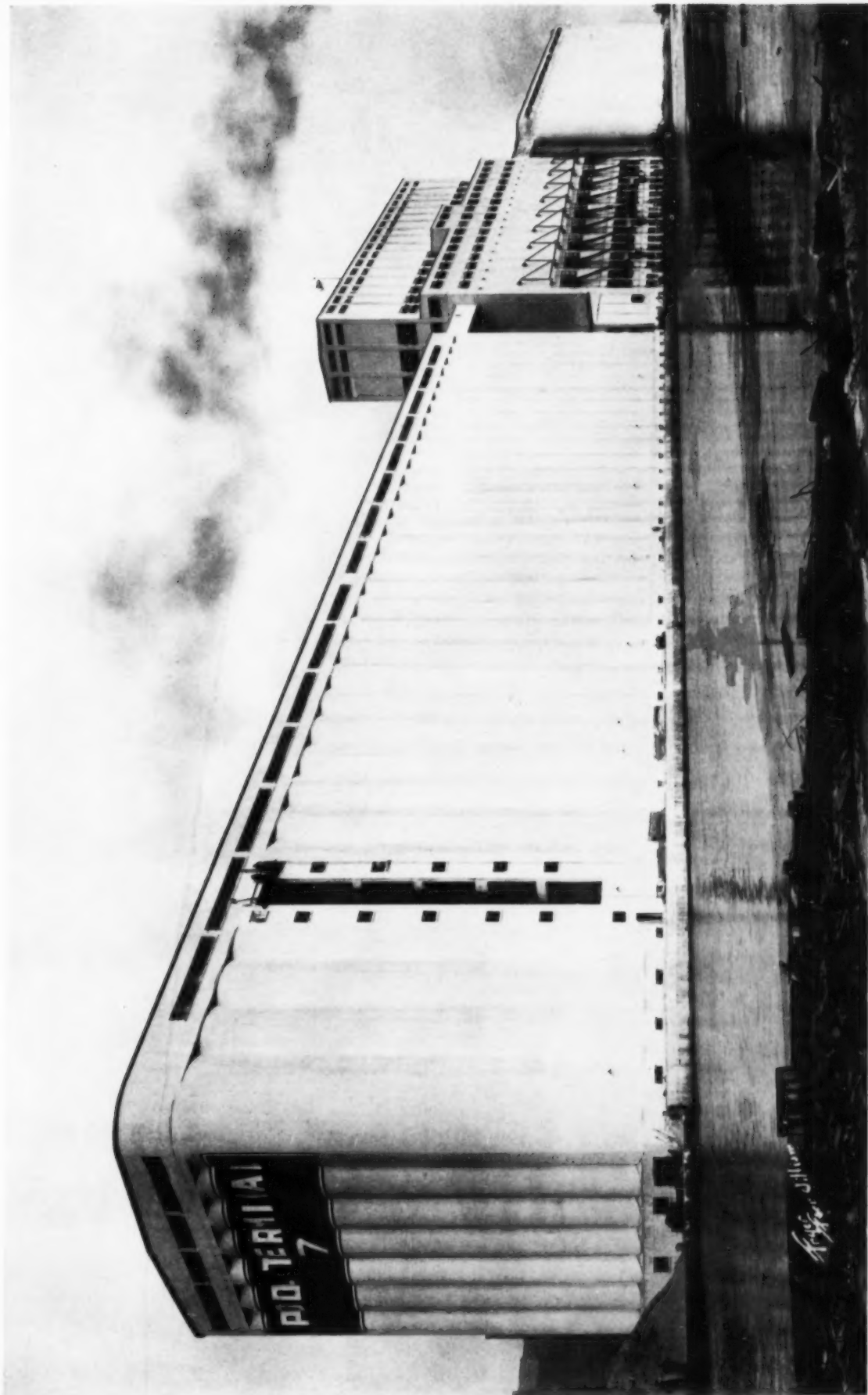
Elevator at Port Churchill on Hudson Bay. The farthest north grain elevator in Canada.



Largest lower lake port elevator used chiefly to lighten grain into Canal boats for Montreal. Prescott, capacity 5,500,000.



A manufacturing storage elevator. Capacity 720,000 bushels. Canada Mill Co., Toronto.



Port Arthur Pool No. 7—capacity 6,900,000 bushels.

Across the second fork of Klinaklini Glacier at about 3,000 feet above sea level. The silverthrone branch (left) is 18 miles to its head, but the middle branch of the three in the photograph is considerably larger. Flanking mountains are dwarfed in height by the plain of ice which is about three and a half miles wide at the forks.



Looking down 6,000 feet on Klinaklini glacier. The dark lines are medial moraines representing marginal debris of branch glaciers before they merged in the trunk glacier. The section shown is about 25 miles long.





EXPLORING WESTERN ICEFIELDS

by DON MUNDAY

Photographs by Mr. and Mrs. Munday

A HEARSAY reference to "a river which flows for 15 miles through a magnificent glacier tunnel 100 feet in height and from 100 to 150 yards in breadth" appeared in a report by Lieut. H. S. Palmer, R.E., to Sir James Douglas, Governor of British Columbia, in 1863.

Probably this was a distorted reference to the great Klinaklini Glacier, 16 air-line miles from Knight Inlet and less than 500 feet above sea level. Exploration of the heart of the Coast Range is a job mostly for mountaineers; few even knew of the glacier's existence; fewer imagined it the largest south of Alaska.

When my wife and I sighted it first in 1927 we never imagined its eventual exploration would involve more difficulties and dangers than any previous Coast Range ventures. Later that same year, C. N. Pretty, of Vancouver, reached a point about five miles up the glacier in a hurried trip.

Shortly after this, Klinaklini Glacier hung out a "No Admittance" sign by thawing back so that an impassable torrent from a side valley barred access to the glacier tongue. This we discovered in 1935. Tumult Creek was too wild to ford, too long to carry supplies around, and unbridgeable with any available materials. The worst blow was that James R. Stanton, big game guide at Knight Inlet, overtook us with news for Philip H. G. Brock, one of our party, that his parents, Dean R. W. Brock, of the University of British Columbia, and Mrs. Brock had been killed in an aeroplane crash; so Brock left us.

With James Varley, son of F. A. Varley, the well-known Canadian artist,

we explored Tumult Valley and got useful information about Klinaklini Glacier. We put much effort into clearing a rough trail up Klinaklini River valley. Varley liked the region so well he accepted employment with Stanton.

The secretary of the American Alpine Club, Henry S. Hall, Jr., of Boston, decided to join us in 1936, and provided a supporting party of two packers, William H. Hinton, of Putney, Vermont, and Sherrett S. Chase, of Philadelphia. Mr. Hall, with his Swiss guide, Hans Fuhrer, was to join us two weeks later part way up Klinaklini River.

The intricate channels of the big glacial torrent ran high in July heat. Stanton and Varley piloted us five difficult miles up-river in a boat. We portaged over log jams, poled and "lined" (tracked) where practicable, waded waist-deep, or even dragged the boat along by overhanging branches.

After Stanton left us we "back-packed" our five weeks' supplies (not with wholly easy minds) through what we called "bear gardens" — dense thickets where bears had newly torn down berry bushes; black swamps where they had gouged skunk cabbage roots; head-high fern patches where a bear would be hidden a yard off; or places where rotting logs had been ripped open or rocks overturned for ants and grubs. We carried no firearms, although these grizzlies are not the somewhat chastened type met in national parks.

Coast Range valleys impress with their depth. Glacial mountains rise a full 9,000 feet above the main Klinaklini River. Densely wooded lower slopes darken in the distance to mysterious violet.



An Ice Age landscape. Looking across the second fork of Klinaklini Glacier, here about three and a half miles wide, and directly up the Silverthrone tributary ten miles. Actually the right hand fork is much larger. In the foreground the glacier is at an elevation of 3,000 feet.

The massive ice-cap of Mt. Silverthrone. The climbers' tracks wind up near the rock ridge. Instead of the snow-dome it appears to be, the summit proved a long knife-edge of granular snow.



A change in the course of the west branch of the river, leading to the glacier, allowed us to escape from tangle woods to several miles of flats, still a desert of boulders and sand uncaptured by urgent vegetation of the coastal slopes of the range.

We planned to span Tumult Creek's roaring width with a quarter-inch wire rope. But two of us must first reach the other side. Once more we tried vainly to ford the only shallow part. We ran real risk of being swept under the front of Klinaklini Glacier.

Travelling light, my wife and I went up Tumult Gorge, crossed Tumult Glacier (about 10 miles long), and came down the far side to the valley mouth. There Hinton and Chase waited to throw a light line across the thundering torrent. Mrs. Munday, a girl guide, signalled my instructions in morse; Chase, a boy scout, received, and Hinton wrote messages in the sand.

With a pulley on the wire my wife and I crossed the lesser channel to a big rock. Crossing the main channel brought us close to disaster; excessive stretching of the wire lowered her almost into the clutching waves though I supported the wire — if the current caught her I would be swept off the rock, and both would be submerged. But she inched her way up toward the high bank till the boys caught her finger tips. Then they sent me over a pole cut high up the mountainside. Wedged in a cleft in the big rock, this lifted the wire just clear of normal flood level every afternoon. Nevertheless the "bridge" remained an anxious link in our communications. Consequences of a mishap were too obvious.

A striking feature below the glacier snout is a basaltic bluff about 300 feet high in the middle of the valley. We hoped to find some trace of the craters or fissures from which these lava flows issued near the end of the last Ice Age (9,000 to 10,000 years ago).

Continuing the monotonous labor of relaying supplies, we cached them about seven miles up the glacier, then moved them on to a camp beside it about five miles farther, and at an elevation of 2,900 feet. Much of the glacier proved a maze of crevasses with no practicable route through them. Near this camp it heaved into ridges 50 feet or more in height and a quarter of a mile long.

Generally the rough mountainsides allowed no alternative route. But in one place beyond this camp we discovered an easy passage through a smooth-walled gorge averaging about 12 feet wide, and 50 to 70 feet deep; this was an exceptional product of chiselling by ancient ice. A natural hollow of dissimilar rock oddly simulated a grizzly's footprint in the wall. Hence the name Bearpaw Canyon.

Not taking the "bear paw" as a grim omen, Mr. Hall, my wife and I passed through the canyon, bound up the second branch of Klinaklini Glacier in search of Mount Silverthrone, dominating the vast snowfields at the head of the glacier.

From an open shoulder we looked down on a young grizzly, probably in its second year. Perhaps bears in here knew nothing of human beings. Believing ourselves at a safe distance, we got out our cameras. The young bear promptly rushed up the rocks at us. But a huge she-grizzly and her two cubs evidently had stalked us, and now with a roar she charged from 30 feet behind us.

We yelled and waved our arms, our numbers fortunately seeming to distract her from actually leaping on any one of us. They drew off, but the infuriated she-bear came back at Mrs. Munday. I diverted it. We roared defiance, so close that one step more and we could have struck each other. Finding she had had more practice at roaring, I finally flung my hat in her face and, backing away, fell to a rocky shelf.

Expecting the grizzly to pounce on me, my wife courageously dashed in with an ice-axe. The bear turned on her again. Having saved me, my wife jumped down a small cliff. The brute then rejoined the younger bears with a final bellow.

Admittedly shaken by our terrifying encounter, we presently resumed our scouting trip up this huge branch glacier, which in turn drew tributary glaciers from every valley and mountainside. Rounding a distant mysterious mountain shoulder, we outflanked an ice-fall and looked along more mysterious miles of glacier winding on till lost in the clouds, but without definite indication of Mount Silverthrone's position amid the branchwork of glaciers.

Worse weather followed; it spurred us to establish a camp in this secluded upper valley over 20 miles from the glacier snout and at about 5,100 feet. Avalanche-



A record of changing climate. During a colder period the Klinaklini Glacier increased and piled his moraine across the mouth of a valley, forming a new lake which drowned the trees
"Believing ourselves at a safe distance, we got out our cameras."



tortured trees yielded us scraggy tent poles and a limited amount of fuel — we had brought gasoline and primus stoves to the base camp, mindful of previous experiences on the immense snowfields of the Coast Range.

Better weather eventually warranted the ascent of Mount Silverthrone, now revealed about eight miles away. The Silverthrone branch of Klinaklini Glacier probably includes 80 square miles of ice and snow, being itself about four-fifths the size of Franklin Glacier in the Mount Waddington region. (See Canadian Geographical Journal, Vol. 5, page 227.)

Silverthrone's crest proved an exhilarating knife-edge of snow plunging thousands of feet into valleys where nameless glaciers elbowed their relentless course far down into forests. The largest of these extensions of the Klinaklini snowfields drained down Machmell River to Owikeno Lake and so to Rivers Inlet.

Clouds marred important sections of the gleaming panorama. "This means we must climb Silverthrone again," we agreed, and therefore panted to the summit three days later, racing persistent clouds which plagued us again, though allowing fairly comprehensive views at times.

Glaciers, not mountains, dominate the landscape here. They tend to dwarf the mountains with their width and the depth to which they fill the trunk valleys. Here it is reasonable to believe lingers a remnant of the continental ice-sheet.

Pending the preparation from our data of a sketch map, Klinaklini Glacier is given an area of approximately 250 square miles, and a maximum length of about 32 miles. Mount Silverthrone stands roughly 30 miles from the snout. Owing to the intensive glaciation of the region, the mountains look more than their real height from a distance. Mount Silverthrone apparently is 9,700 feet. Higher mountains rise at a distance; we extended our knowledge of these as well as of the vast Klinaklini

Glacier system by several trips in various directions. Some of us totalled about 180 miles of glacier travel.

The previous winter's light snowfall, combined with the comparatively low elevation of the glaciers, made skis of less use than had been anticipated. They were carried 90 miles!

We carried extra food on the homeward trip down the glacier lest Tumult Creek had destroyed our bridge. When safely across, we counted most real dangers over, barring the boat trip down the lower river.

But next day, while ahead of the party, our packers, Hinton and Chase, discovered two grizzlies fishing for salmon. Though over 300 yards away, one bear promptly raced towards them, roaring its rage. Open gravel flats offered no refuge. Almost compelled to swing their ice-axes in self-defence, they outfaced the brute — before this they had wanted to sight a grizzly or two.

Climatic changes are recorded graphically by these great glaciers. At a not very remote date a colder climate crept over British Columbia; the snow-line descended at least five hundred feet. Klinaklini Glacier's increased bulk pushed down the valley, crushed forest and buried it under moraines. So recent was this that dead trees still remain erect in a lake in a valley-mouth dammed by a moraine.

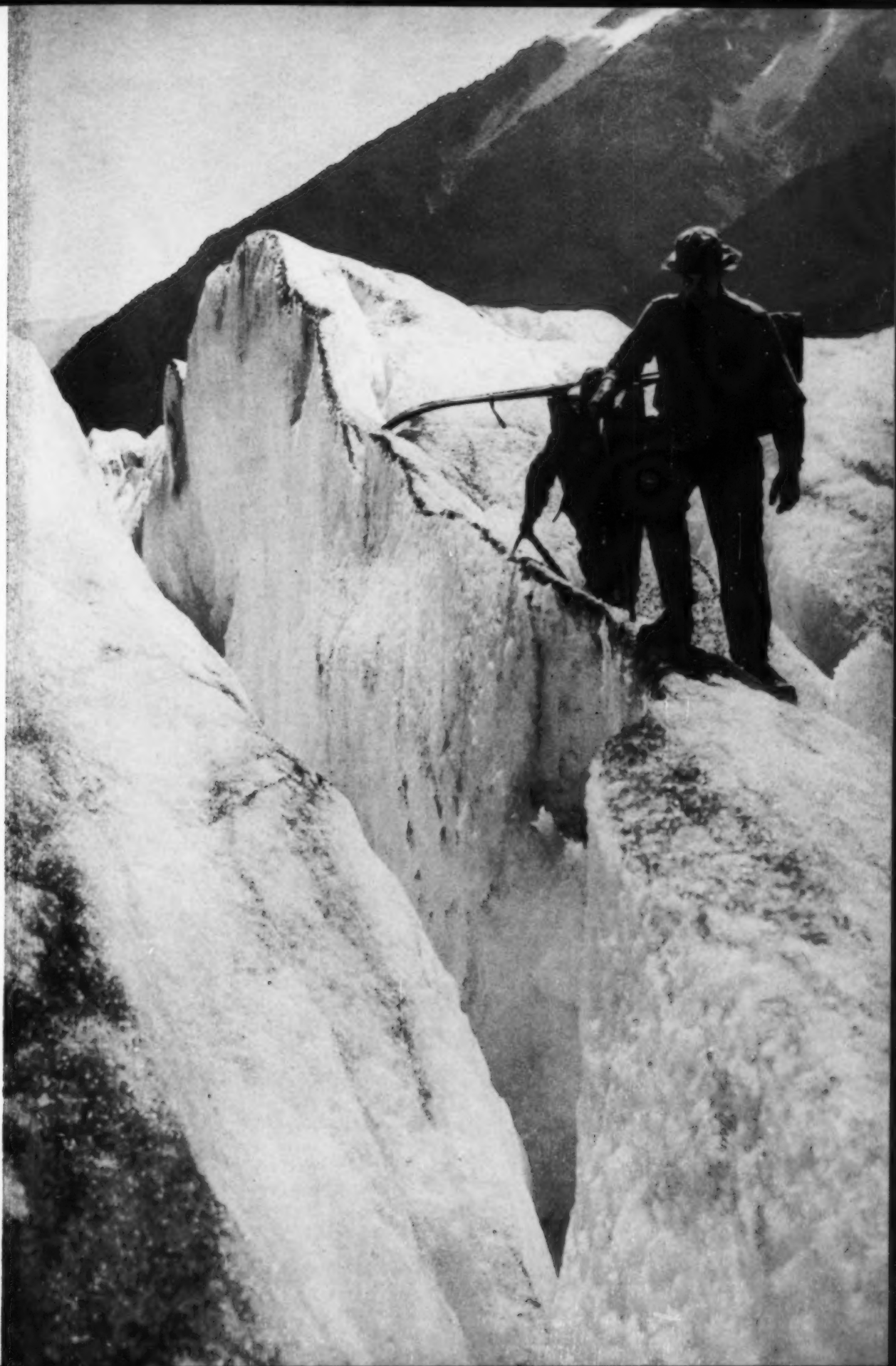
Since then the mean temperature has risen three degrees at least. Consequently the lower part of Klinaklini Glacier has shrunk 400 or 500 feet in thickness, so the ice-front is "retreating" — it is not, as the credulous lady was told about a glacier, "going back up the valley to get more rocks," but is melting a bit faster than it comes down. It lost from 200 to about 400 feet in length last year.

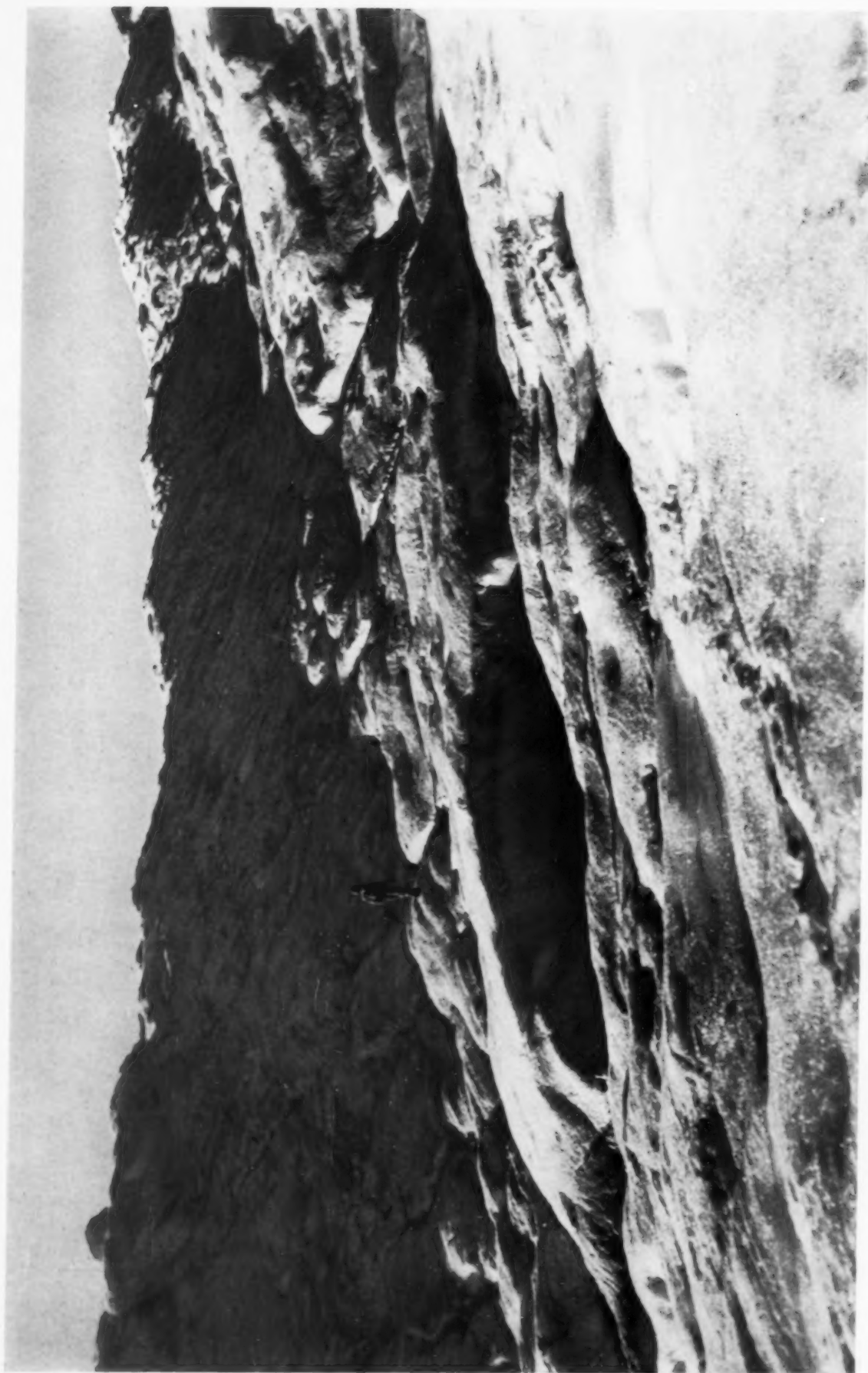
Stanton met us with his boat as arranged. At least some of us felt real relief when he delivered us and our belongings safely on board our little gasboat at the river mouth.



Mrs. Don Munday on the trail. She has spent ten seasons exploring the little known Coast Range with her husband.

"Back-packing" along the narrow lip of a crevasse — typical traveling on the rugged Klinaklini Glacier. The second man has skis across the top of his pack.





One of the steep barrier ridges of ice 50 feet high and sometimes a quarter of a mile long met by the explorers on Klinaklini Glacier.



Branches of one of the big unknown glaciers discovered beyond Mt. Silverthorne, draining through Owikeno Lake to Rivers Inlet, famous for its sockeye salmon fisheries.



Camp in the last vegetation about 22 miles up Klinaklini Glacier beside the Silverthrone branch of it. The small lake, like many in this region, rapidly filled or drained out repeatedly.



Bear-Fang Mountain rises out of the Arctic wilderness of snow of upper Silverthrone Glacier.



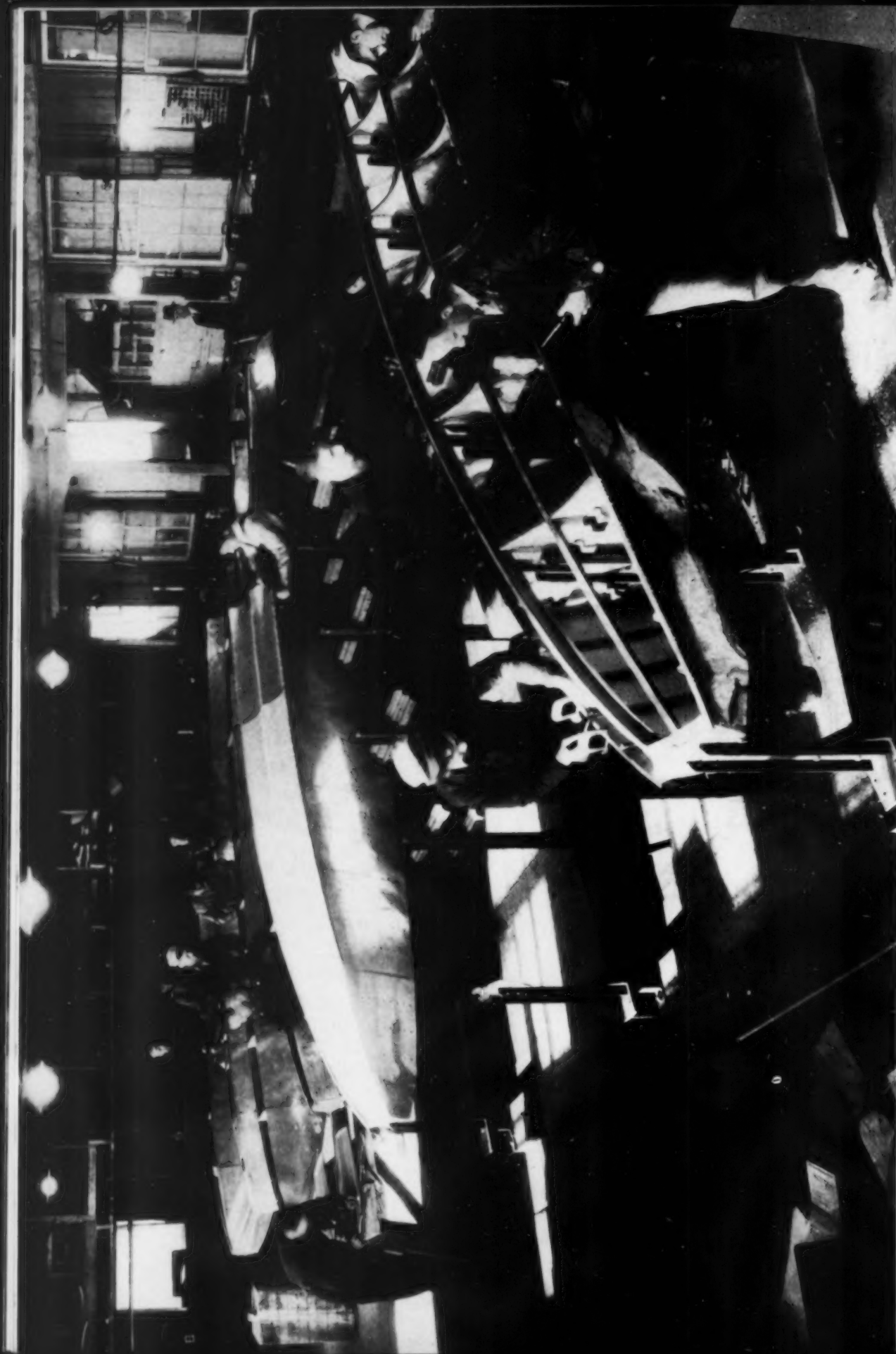
Glacial peaks rise 9,000 feet above Klinaklini River. The tree-capped cliff is the remnant of lava flows below Klinaklini Glacier.

Don Munday testing the Tumult Creek "bridge," a quarter-inch wire invisible in the photograph.



*Freighting supplies up
a small channel of
Klinaklini Glacier.*





COMMERCIAL FLYING IN CANADA

by J. P. de Wet

DISTANT Canada today is presenting an era in the commercial development of her frontier territories that is nothing short of startling. It is due entirely to the initiative of the Canadian man, plus the support of that fast hand-maiden, Aviation, who offers to enterprise speed and willing service.

The tempo of development is gathering increasing momentum. The coming of the aeropilot with his flying machine has cut remoteness from days to hours. One stands astounded at what the airman has wrought. Ten years ago one estimated distance in miles. So many miles from here to there, and the time factor depended on the way luck favoured a variety of travel circumstances. Today, distance is measured in hours.

One nonchalantly packs his grip, dons ordinary street wear, boards a heated aeroplane (in winter), flies 350 miles there, and returns the same day. Air Commodore H. Hollick-Kenyon, Canadian Airways' staff pilot and pilot on the Lincoln Ellsworth Antarctic flight, did that on February 9, 1935. He left Stevenson Field air port, Winnipeg, at 9 a.m. with three passengers and a quantity of freight, for Gods Lake mining camp, northeastern Manitoba, and was back again the same day at 4.15 p.m.

But an even better day's flying is credited to H. Marlow Kennedy, another Canadian Airways' flier, who left Winnipeg one morning about 5 a.m., flew to Gods Lake which he reached about 8.30 a.m., set out again for Winnipeg about 10 a.m. and arrived at 2 p.m., and then took off for Norway House which he reached about 7 p.m. He flew 1,040 miles in 14 hours that day, a remarkable performance.

Mining is the great energizer of this new, astonishing era in northern Canada development, and is the chief customer of the commercial aircraft operators. Metal mining is meant. It ranks second among the great basic industries of Canada, and in 1935 gave work to one-third more people than in 1929. In 1935 it paid in wages and salaries \$50,800,000, and paid out \$96,600,000 for its purchases of various supplies, including electricity, to carry on its business of providing employment directly to about 40,000 persons, and

indirectly to many additional thousands. And in 1935 aircraft operators in Canada, engaged chiefly in servicing mining operations in no longer far-away areas, transported 177,472 passengers, 26,439,224 pounds of freight, and 1,126,084 pounds of mail.

In other lands, aircraft are looked on as the competitors of the railways, but in Canada aircraft routes are feeder lines to railways. In the old days, after the gap between Port Arthur and Winnipeg was bridged, the railways pushed ahead first over the prairies and the settlers followed, but now aircraft carry the Argonauts who venture beyond the railway stations in their search for the modern Golden Fleece.

The idea of using aircraft in the Canadian North is an old one. Ask any old prospector who has spent many a weary day over the portages and he will tell you how years ago he dreamed of things as they are today. His dreams of course were very vague. Back in 1915, soon after Tom Creighton and his associates discovered and staked the Flin Flon properties in northern Manitoba, now the site of one of Canada's great mines, Jack Hammel, their backer, told them some day he would provide them with aeroplanes to get around in. They laughed, but he did, organizing in 1928 Northern Aerial Minerals Exploration, Limited, for the express purpose of conducting mine hunts on a large scale with aircraft as the chief transportation agency.

The first aircraft passengers are the Geological Survey of Canada man and his party, who make the initial reconnaissance. They spy out the land, spot the areas of "greenstone", examine them for metal-carrying intrusives. "Here and there" they point out on the maps, "are favourable prospecting areas." These are the oases in the wilderness of barren granite where possibly a Golden Fleece is hidden.

The next customers of the flying man are successively the prospector and the mining engineer. The first explores the area indicated by the geologist, tracing the "breaks" through which the intrusives have forced their way, looking for outcrops, and when he finds them, chipping off little pieces to be examined for evidence

Photos by L. B. Foote: Edo floats for aeroplanes being built in Winnipeg by McDonald Bros. Aircraft Ltd.



*Taking aboard grocery orders
for a western Ontario mining
settlement.*

*Meeting an aeroplane of Wings,
Limited, at Bissett—a mining
centre in southeastern Manitoba.*



of precious ore and other metals. If these are found, the next arrival is the geologist or the mining engineer, representing investment or speculative capital. From him comes the word to open up the find by trenching and stripping off overburden to determine the superficial importance of the discovery. The aeroplane is their taxicab from the nearest railway station.

The diamond drill crew and equipment next are flown in. The drill brings to the surface segments of rock, called cores, which are closely examined, both visually and by assay, for evidence of metal wealth, and the extent of the deposit is checked for length, depth, and indicated richness. Now comes the word to sink a shaft and undertake underground exploration at varying depths.

Shaft-sinking and drifting machinery is for the most part beyond the capacity of the ordinary aeroplane and goes in overland. If suitable water routes exist or can be developed, as in the Red Lake area, northwestern Ontario, this freight can go in either summer or winter, with the latter period favoured for the really heavy articles. In the central Manitoba area, the water route does not favour the movement of heavy freight in the summer months, and this goes to the mines over winter roads. In the Mackenzie river territory, North West Territories, the distances are too great for roads, and the heavy freight goes down by water route in the summer months.

The machinery manufacturing companies, however, have developed a technique for the transportation by air of quite large pieces of machinery, and the carriage by Canadian Airways of a complete mining plant into the property of Consolidated Chibougamau Goldfields, Limited, was an event of the 1934-35 fall and winter flying operations in the Chibougamau mining area of Quebec. It was the first complete mining plant of any kind taken into the Chibougamau field, and was one of the most complete mining plants to be taken in anywhere entirely by air. That operation was an important landmark in the history of Canadian mining and air transportation.

Up to within a few years ago that would have been impossible, for the reason that there were no portable air compressors of sufficient capacity anywhere near a size that could have been transported by air, even if the machine had to be shipped in

parts. But in order to discover the best method for packing or loading the equipment, Canadian Ingersoll-Rand Company, in conjunction with Canadian Airways, Limited, who were to provide the transportation, built full-size models of the loading doors and cabin space of the aircraft that were to be used.

In their plant at Sherbrooke, Quebec, they experimented with the aeroplane models to discover the simplest and most economical manner in which to break down and pack the air compressor, hoist and other parts. In some cases, where it was found that a base, perhaps, was too long or too heavy, it was cut in two and fitted up so that it could be re-joined at the mine camp with ease and safety. Numerous other points, incidentally, were also discovered which will be of future value in determining whether certain types and sizes of machinery can be shipped piecemeal in aircraft.

Starting early in the autumn of 1934, Canadian Airways' pilots flew load after load of machinery and supplies into Chibougamau from Oskelaneo, the air base, a distance of 125 miles. When winter set in, they packed away their floats and, replacing them with skis, continued through the cold winter months. It might be mentioned here that the Airways' company manager at Oskelaneo was J. H. "Red" Lymburner, assistant pilot and engineer on the Lincoln-Ellsworth Antarctic Expedition.

The first set of machinery, consisting mainly of an oil engine-driven air compressor, a single-drum hoist, rock drills, boilers, pumps, ore buckets, and the other incidental accessories for a mining plant, was found to be inadequate to meet the needs of the rapidly developing property. During the winter months it was decided to expand the mining operations. Thereupon two steam-driven compressors, weighing about 11,000 pounds apiece, were ordered, and with the same intelligent and thought-out handling were successfully taken in, together with a double-drum hoist, more pumps, and additional operating equipment. Incidentally, included in the shipments were two 1,400-pound oxen, air freight novelties that excited much attention that was not only local.

"Bush flying," which is the name commonly given to commercial air transport beyond the sphere of the railways, has much romantic interest in its history.

Loading in a snow-storm, at Sioux Lookout, air mail for the Red Lake mining camps



The six cylinder Diesel engine shown above, weighing 1950 pounds, is being loaded at Oskelaneo for a 125-mile flight to Consolidated Chibougamau Goldfields, Lac Doré, Que. (See text)

Six boiler drums similar to the above were transported by Canadian Airways from Oskelaneo to Lac Doré, Que., 125 miles, for Consolidated Goldfields Limited, during the winter 1934-35. Each unit weighed 950 pounds or more. (See text)



It is only seventeen years old, but is packed with event and achievement.

Forestry officers had long thought that float-equipped aircraft would provide invaluable assistance in the patrol, for fire-detection purposes, of the great forest areas in Quebec and Ontario. The Quebec Provincial Government was persuaded to vote a small subsidy for trial flights, and the Dominion Government in 1919 lent two flying boats which had been used for anti-submarine patrol on the Atlantic coast, and were then in store at Halifax and Sydney.

The work was entrusted to the Laurentide Air Services, Limited, which engaged a pilot and engineers, and after the two boats had been given a thorough overhaul, they were flown to Lac à la Tortue, a short distance from Grand'Mère. The first civil air harbour in Canada was then established, and the first practical use of aircraft for civil purposes was then got under way. The patrols were again continued in 1920, and with increased forces during 1921, and definitely established their value. Today, forest fire protection and control services are carried out by air services owned and operated by the province of Ontario and Manitoba, and carried out by the provinces of Quebec and Saskatchewan under contract with commercial companies.

Fire-detection patrol by aircraft is costly, so this branch of the work is kept down as much as possible, and reliance is placed on tower observation as far as possible. When an outbreak is discovered by an observer he sends a message to the base by telephone or carrier pigeon, and if the fire is in isolated territory, an aeroplane with a ranger as passenger is despatched immediately to the scene. The fire is reconnoitred from the air to learn its extent and to plan for the suppression attack.

Men are then flown with supplies and equipment to the nearest lake, where a temporary base is established. Some of these lakes are small, and consequently good take-off performance is demanded of the machine. The fire is inspected frequently, the foreman of the crew being taken up to note the danger points, or where best to concentrate his efforts. Supplies, equipment and men are flown in or out as the occasion demands, and after the fire is put out, the entire crew is flown back to its base. Another development of forest flying is timber-cruising, for the purpose of estimating the extent

and variety of commercial timber available.

Air services to the miner and the prospector then came into the flying man's picture, as the natural sequence to forestry flying, following the rich mineral discoveries that later led to the development of Quebec's wonder mine, the Horne, owned by Noranda Mines, Limited, at Rouyn, and Laurentide Air Services again made aviation history when, in September, 1924, the Company inaugurated between Haileybury and Rouyn, Canada's first regular air mail, passenger and freight service. More than 1,000 passengers, 80,000 pounds of freight, and thousands of letters and telegrams were carried, but unfortunately the Company's operations were not profitable and it went out of business at the end of the year.

This year was notable also for a great advance in aerial photography, as a consequence of the organizing of Fairchild Aerial Surveys Company (of Canada) Limited, associated with the Fairchild Aerial Camera Corporation, of New York. The company owed its formation to the interest in aviation, as applied to forest conservation work, of Ellwood Wilson, of Grand'Mère. Before a sound programme of forest conservation can be undertaken, the nature and extent of the forest resources, and their condition and rate of growth must be known, so that measures can be taken to place the forests on a continuous basis of production, and balance the annual cut and depreciation from other causes with the annual increase through natural growth and reforestation after cutting or burning.

The company was formed in 1922, but its officials had not then contemplated owning or operating aircraft. However, it was found that the duties they had undertaken made possession of aircraft necessary, and in 1924 a specially designed aeroplane was bought. During the season 1,425 square miles of mosaics were completed in Quebec.

Topographical air survey came next, a notable incident of 1925 being the photographic air survey over Fort Nelson, Hudson Bay, which finally determined the choice of Churchill as the terminus of the Hudson Bay Railway, so long insisted upon by prairie residents. Air survey was assigned to the Royal Canadian Air Force, and in 1927 the force had no less than 16 machines engaged on photographic operations for the Topographical Air Surveys Branch, Department of the Interior.

Drums of fuel oil at Gold Pines, Lac Seul, destined for the Argosy Gold Mines' camp at Casummit lake, per Canadian Airways' Junkers "flying box-car." Each drum contains 30 gallons of oil and weighs 310 pounds, and the contract called for 170 drums to be flown over a 70-mile air hop.



A 3,500-pound load of radium silver concentrates about to commence a journey, per Mackenzie Air Service "Radium Silver Express," from Eldorado Gold Mines' mine at Echo bay Great Bear lake, N.W.T., to the radium refinery at Port Hope, Ont.

Strange cargo! Two live oxen were flown from Oskelaneo to Lac Doré, Quebec. They were laid on their sides in the hold of the aeroplane and tied down for transit. (See text.)



Aerial survey made it possible to map previously unmapped areas rapidly and economically, and within ten years some 470,000 square miles of undeveloped territory had been mapped, and about 600,000 individual photographic prints had been made available for detailed study and reference by prospectors, geologists and mining engineers, or anyone else interested in the areas over which they were taken. These photographs form the nucleus of a National Photographic Library, constituting one of the greatest collections of detailed geographical information ever assembled. They cover, principally, areas for which no geological map has been compiled, and for this reason afford the only opportunity of studying these areas intelligently before entry.

Going back again to mining, the next event was the discovery in northwestern Ontario of gold in the vicinity of Red Lake, in 1925, and Patricia Airways, Limited, was organized by H. A. Oaks, a war-time flier, to operate from Sioux Lookout. One dollar per pound was the rate charged, and it was on the cards that a very big man would be charged just twice as much for his flight as a lightweight. During that season Patricia Airways transported 260 passengers, 14,000 pounds of freight, and 3,000 pounds of mail.

A noteworthy flight of that year was the Lieut.-Col. J. Scott-Williams' expedition in an amphibian from Prince Rupert, via Wrangell, Alaska and Telegraph Creek, to the Dease Lake District, for a mining and exploration syndicate working in this district. From a base there, the engineers were flown into the remote interior as far as Fort Frances, in the Yukon Territory, and to the upper waters of the Liard River to Liard Post. In about six weeks, prospecting was carried out that would have taken months of laborious travel with ground transportation.

We must now skip a number of years, just skimming perforce with bare mention many meritorious performances of aircraft, notably in March, 1927, the transportation from Cache Lake, on the Hudson Bay Railway, to Churchill, by Western Canada Airways for the Department of Railways and Canals, of 14 men and eight tons of equipment which had to be there before the spring break-up; the Hudson Strait Air Survey Expedition of 1927 and 1928; the transportation of 180 labourers from Hudson, Norway House and Split Lake to

Churchill for the Department of Railways and Canals in the spring of 1928; the landing by C. H. Dickens, O.B.E., on July 1, 1929, of the first aeroplane at Aklavik from Edmonton, a 1,900-mile flight in 17 hours flying time; the inauguration by W. R. May, O.B.E., in December, 1929, of the first air mail service down the Mackenzie River to Aklavik; the 5,000-mile flight of W. R. Gilbert, F.R.G.S., with Major L. T. Burwash, F.R.G.S., over the Arctic Coast, Boothia Peninsula, the Magnetic North Pole, and the supposed camp sites of the Franklin Expedition, in the summer of 1930; and the farthest north charter flight ever undertaken by a Canadian pilot, that of the late W. A. Spence, with R. H. Bonnycastle, of the Hudson's Bay Company, flying from Coppermine over the ice-dotted waters of Dolphin and Union Straits, across Wollaston Peninsula, Prince Albert Sound and Minto Inlet, and down into tiny Walker Bay, Victoria Island, 300 miles north of Coppermine, returning, on September 7, 1931.

Space forbids any detailed mention of these and many other epochal flights, and one must now rush back to today's work by the aviation companies in servicing the mining settlements. All through the stage of initial development, and on into the period of permanent settlement after the mine comes into continuous production, the aeropilot and his flying machine provide a constant and dependable general transportation service. He carries to and from the mine camp, commercial travellers, visitors, mine employees and their families, groceries, mail order purchases from the large cities, movie films for the camp theatre, rush express packages, letter and parcel mail, the daily newspaper, and the thousand and one necessities of every day modern life.

The regular air mail services are the means by which the miners and their families keep in touch with civilization, bringing the necessities of life with little inconvenience, and making for comfort and content in what would otherwise be primitive, frontier settlements. The biggest air mail postal division in Canada is that of Winnipeg, with ten routes. These serve the mining camps of northwestern Ontario at Red Lake, Pickle Crow, Lake of the Woods and Casummit Lake, from Sioux Lookout and Kenora, and the camps of southeastern and northeastern Manitoba from Winnipeg.

Eskimos at Cambridge Bay, Victoria Island, loading white fox furs.



W. E. Gilbert



*Loading up a prospect-
or's canoes at Fort
Rae, North Arm, Great
Slave Lake, N.W.T.
Note how the canoes are
bound to the floats.*

*A stretcher case from
a Quebec mining camp
arrives at Noranda to
go into hospital.*



In the period December 11, 1934, to December 11, 1935, air mail carried in the Winnipeg postal division totalled 339,982 pounds, practically 170 tons. The volume of mail matter on these ten routes, which includes the connection with the United States transcontinental air mail routes, continues to grow, and postal records for June, 1936, show 37,542 pounds of mail flown, the heaviest poundage for any one month yet, with the exception of December, 1935, which included the Christmas deliveries.

The historian will be interested to know that history is repeating itself on the air mail route between Winnipeg and Eastern Canada, via Pembina, St. Paul, Minn., and Windsor, Ont. This is the same route that was chosen in 1826 for the first movement of mail from the Red River Settlement to the East.

Specific instances of the general service given by the commercial aircraft operator to the mining settlement should be included before one closes this narrative. Mining camps 150 miles distant from Winnipeg are in effect suburbs of that city. They get a daily postal delivery, which is equal in frequency to that of the suburbs on the outskirts of that city. The morning edition of the Winnipeg Free Press is delivered the same day to them, and also to Red Lake, Ontario, which is 180 flying miles distant.

Broken parts of machinery, not stocked in Winnipeg, and to replace which from the factory would mean several days' delay, have been flown to iron-working firms there. Moulds were made in their shops, the new parts cast and machined—the men working all night—and the replacement flown back to the mine the next day. That actually is better service than can be got 20 to 25 miles from Winnipeg.

On March 8, 1935, three pilots of Wings, Limited, flew a hockey team and 14 passengers from Bissett to Winnipeg, 120 miles, to play in the Manitoba hockey championship. On March 29, 1936, Pilot Roy Brown, also of Wings, Limited, flew in from Winnipeg to Bissett for attendance at an inquest, the prisoner in an assault case that ended in death, two police escorts, the crown prosecutor, and prisoner's counsel. They returned to Winnipeg the same day.

Mercy flights, which always used to gain space in the daily newspapers, have now become so frequent that they have almost lost news value, but Pilot Ronald George, of Canadian Airways' staff, figured

in one on December 4, 1935, that will be very hard to beat for its many angles of interest. His passengers were an urgent maternity case with husband and medical attendant from Flin Flon to Winnipeg.

At 6 a.m., that mid-winter morning, Canadian Airways' officials in Winnipeg received a telegram from Flin Flon asking if they had an aeroplane nearer to Flin Flon than Winnipeg. Their nearest machine was Pilot George's at Gods Lake, just over 300 miles from Flin Flon. He was contacted by radio from Winnipeg at 6.45 a.m., and left in a snow storm for Flin Flon at 8.35 a.m. Arrow Airways' officials at Channing, air base for Flin Flon, were then notified by telegraph, and arrangements were made with them to receive Ronald, re-fuel his plane and provide him with weather reports.

They also were given the estimated time of George's arrival. George reached Channing within five minutes of the estimated time, re-fuelled, emplaned his passengers, and took off again within 30 minutes. The probable time of arrival at Winnipeg next was calculated, and arrangements were made there for an ambulance to meet the aeroplane at Stevenson Field Airport, also with the Winnipeg Flying Club for flood-lighting the landing field in the event the flight from Channing could not be completed before darkness fell. However, George brought his passengers down at 4.50 p.m., the woman was rushed to hospital in the ambulance, and the baby was born two hours later. The distance flown by Pilot George was 740 miles, and his flying time was 7 hours, 15 minutes, just about all the hours of light that day. (Sunrise, 8.07; sunset, 16.28, Winnipeg times.)

Just one more instance before closing. During the first week of June in the current year, Canadian Airways commenced the biggest single air freighting job yet placed in North America, with the initial loads of a 700-ton contract with Argosy Gold Mines, Limited, Sasummit Lake, in the Red Lake mining division of Ontario. The freight is flown from Gold Pines, the end of navigation on Lac Seul, to the mine camp, an air hop of 70 miles. About 420 tons consists of fuel oil, and the remainder of mine and mill supplies, and builders' steel and material. It is tremendous tonnage for air shipment, but although the combined water rate from Hudson to Gold Pines and air rate from

Shows Right Rev. J. G. Anderson, D.D., bishop of the Anglican diocese of Moosonee, Ont., at his Rupert House mission, James Bay. His companion is J. H. Lymburner, co-pilot on the Lincoln Ellsworth Antarctic expedition, and Canadian Airways' superintendent at Oske-laneo, Quebec.



Moving day in the Rice Lake mining division, southeastern Manitoba.

Taken at Canadian Airways' base at Coppermine, N.W.T., shows Right Rev. G. Breynat, O.M.I., D.D. (centre figure), visiting Oblate missions along the Arctic coast. His companions are, left to right, Capt. Lockhart, Royal Canadian Corps of Signals, and Pilots Con. Farrell and Alton Parker.



Gold Mines to the camp is somewhat higher than that being charged at present over the winter overland route, the mine officials decided to use summer air freighting to save immediate expenditures on supplies last winter, and take in the supplies as needed. The aeroplane chiefly in use on the contract is the Junkers JU52, known in the west as "the flying boxcar," which can fly loads of nearly three tons.

Nor must one neglect that other Titan of the air, the Radium-Silver Express of Mackenzie Air Service, Limited, bought early last year for transportation duties on the 821-mile run between McMurray and the radium-silver mine owned by Eldorado Gold Mines, Limited, on Hunter Bay, Great Bear Lake, North West Territories. It can carry a payload of 4,000 pounds for 500 miles at 140 miles per hour without re-fuelling, and in one month last year, ten days of which were the worst kind of weather, 30,557 pounds of concentrates were flown from the mine south to McMurray, and 35,000 pounds of supplies

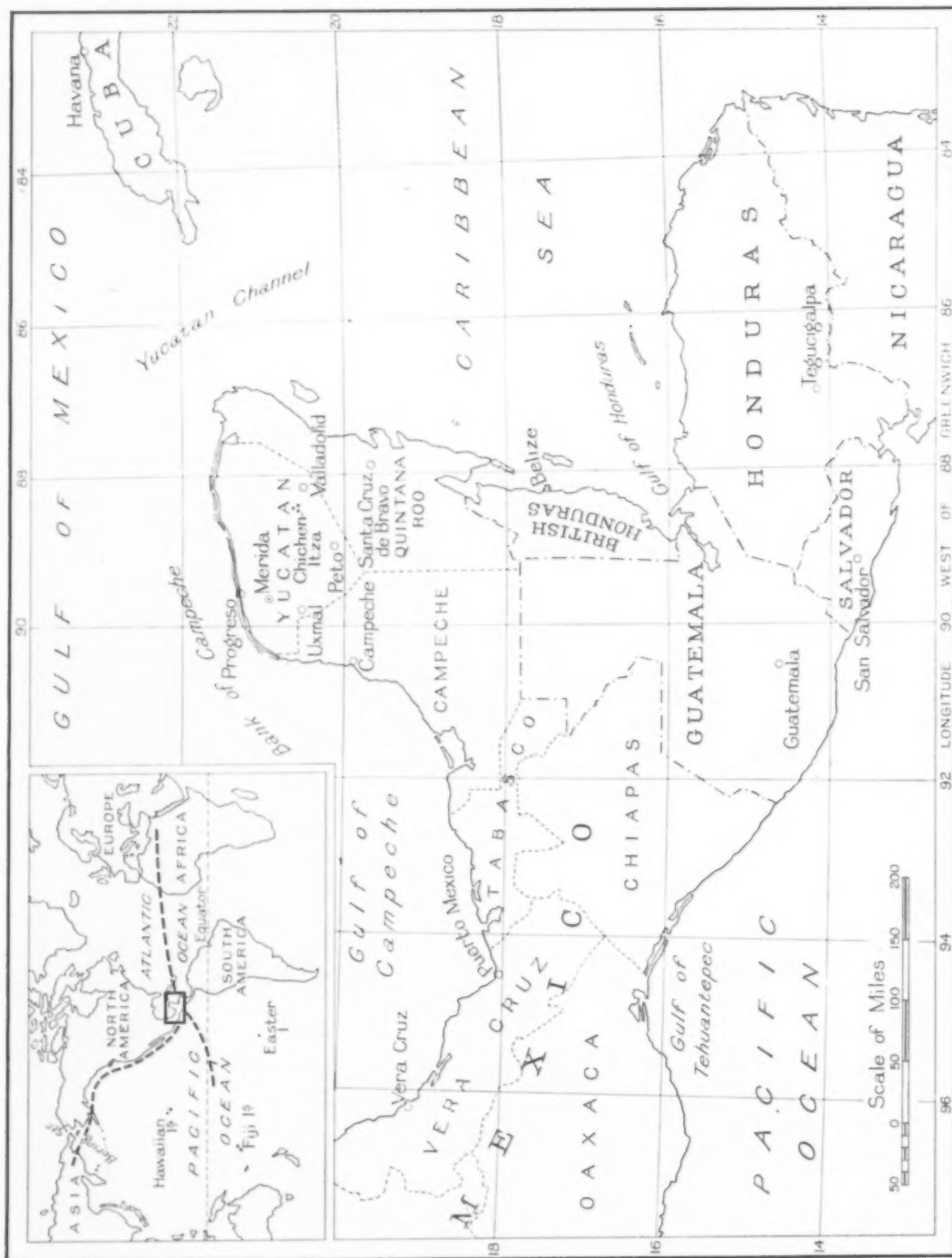
and passengers were moved north on the outward flights.

One could write almost indefinitely on the feats of the aeroplane in the commercial life of Canada. Reams can be written about flying fish from distant lakes to railhead, about fisheries patrol from the air, about flying fur and fur merchants on visits to traplines, about flying high church dignitaries on their journeys to missionary outposts, about flying cabinet ministers and department heads on inspection tours, and about mounting poundage, lowering costs and increasing revenues in the carriage of mail by the Post Office (in 1932, 413,687 pounds; in 1935, 1,126,084 pounds), and about flying brides going to their fiances to be wedded.

But the editor of the Canadian Geographical Journal said 2,500 words, and that limit is now well exceeded. So one regretfully turns back to the keyboard, and pounds out impatiently, FINIS.



Three aircraft of MacKenzie Air Service Limited at Fort McMurray, end of steel, Alberta, loaded with 5,500 pounds of Christmas, 1935 presents, for mining settlements on Great Bear Lake, N.W.T., over 800 miles distant. The big ship at the right is the "Radium Silver Express" that can carry a payload of 4,000 pounds for 500 miles at 140 miles per hour without re-fuelling.



Drawn by W.J. Flood

LANDING IN MAYALAND

by MADGE MACBETH

THE thing that struck me most forcibly during my 26,000 mile trip through South America, Panamá, Cuba, Yucatán and Mexico — not to mention the United States and a modest portion of Canada — was the number of people who had preceded me in places I considered as remote as Lhasa. Take the Maya Ruins, for example.

I knew they had been "discovered", that the Carnegie Institute, as well as the Mexican Government, was making excavations and restorations, there; I remembered that Lindbergh had flown over the area a few years ago and had sent us flying to books of information about that mysterious people whose origin is still only guessed at and whose empire was highly developed at the beginning of the Christian era. But I never dreamed that visitors from nearly every country on the globe had penetrated Maya-land, until I saw their names recorded in a Government Register.

The Maya area comprised the modern Mexican states of Yucatán, Quintana Roo, Tabasco, Campeche, Chiapas and southern Vera Cruz; also, Guatemala, Honduras, British Honduras and San Salvador — a territory of one hundred and fifty thousand miles. Throughout this entire area, Mayan date stones, which archeologists are able to read and correlate with our own time computation, are distributed; and nowhere else. I am touching, however, only on the northeastern section of what is called the Peninsula of Yucatán, claiming 55,000 square miles and a population of some 400,000 souls. This will be found at the right-hand tip of the crescent scooped out of Mexico by the Bay of Campeche.

Only twenty five feet above sea level, this bit of Yucatán has nothing that can be called a mountain, nor has it any surface rivers. Rain water filters through the porous limestone and forms subterranean streams and pools, called *cenotes* by the Mayas who built cities round them, considered many of them sacred and used them for sacrificial purposes. Small blind and scaleless fish are often found in their faintly saline waters.

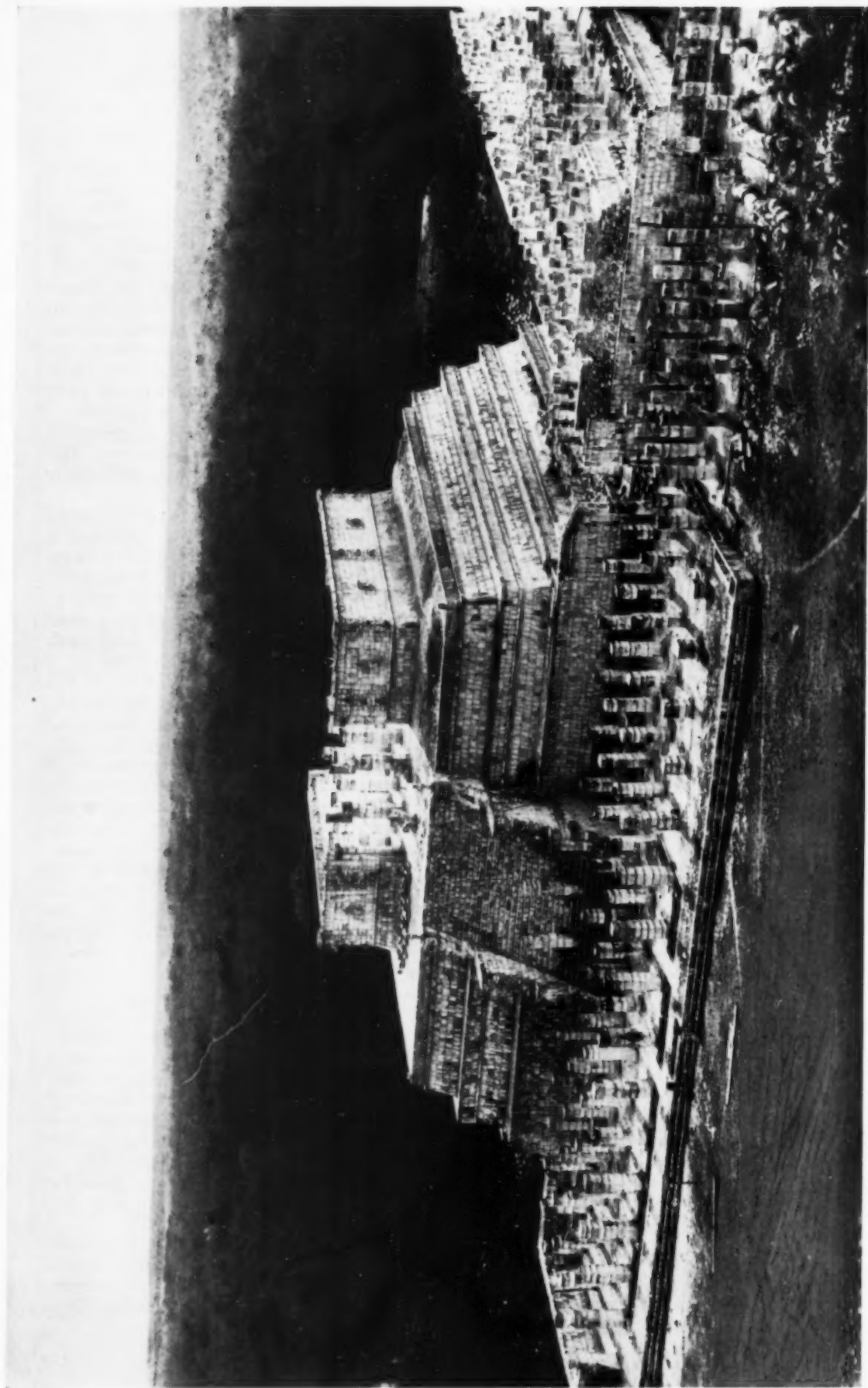
Maize, rice, cotton, tobacco and sugarcane are grown on the Peninsula, but its

chief source of wealth is *henequen*, better known to us by the name of the port from which it was shipped, Sisal. It is a species of the agave, its leaves furnishing the ancient people with material for many of their common commodities, and to-day yielding fibre from which rope is made. Under the new Agrarian Law, its production has been cut until now only about a fifth of the land is planted in *henequen*, with the result — as seen by merely an interested outsider — that Java and South Africa have materially increased their markets.

There still seem to be a great many people holding the idea that this was a young continent inhabited by a few savages when Columbus "discovered" it in 1492. Nothing of this is correct. According to Churchward, from whose fascinating work "The Lost Continent of Mu," I shall quote frequently, Yucatán was the home of a highly civilized people at least 15,000 years ago. Between then and the coming of the Spaniards, hundreds, yes, thousands of people "discovered" Maya-land. Their records are neither so easy of access nor so easy to read as those written after the Montejo Conquest in 1542, consequently the average visitor nowadays takes excerpts from these latter and delves no deeper.

Nearly every tourist learns that two opinions are held regarding the origin of the Mayas, who when found by the Spaniards were a homogeneous race of dark-skinned people, speaking a common language and enjoying all the privileges of a highly-developed civilization. According to the religious standards of their conquerors, they were heathens, idolators, and it is certain that they performed many revolting ceremonies requiring human sacrifices. But they had a national literature, they were versed in Art and Science, and their calendar showed a familiarity with the heavens that was not approached by their enlightened invaders. It is said that they could accurately compute any date back 3,000 years.

Whence came all this specialized knowledge, not only in Mathematics, but in Constructional Engineering . . . witness their pyramids and their arches built



The Warriors' Temple or Temple of 1,000 columns, in Chichén Itzá. One record states that it covered 20 acres and was still growing because the Mayas added to it every cycle. A cycle was 52 years.

without a keystone; an architect states that Maya buildings gave the inspiration for our modern set-back skyscrapers . . . in their tempering of metals, their Vulcanizing? From where did they gain their skill in Agriculture . . . by careful and labourious selection they evolved maize . . . their Social Laws and Statescraft? From where did they learn the art of road-building? Theirs was the model followed last century by John Landon McAdam.

"Why," answers one group, promptly, "from Egypt, of course. Where else?"

"How would they have come from Egypt?" asks the opposing faction.

"Across the continent of Atlantis," answers the first. "It is well established that land lay between Africa and the eastern shore of America."

"But except for their pyramids and hieroglyphic writing, no connection exists with Egypt," object the others. "They obviously came from Asia, across Behring Strait and by slow marching, down the west coast, looking for a favourable land in which to settle. Somewhat south of Yucatán they found it, for many old chronicles tell of their coming from the south, where they must have been driven out by war or pestilence or famine. Look at their Mongol faces and consider the several Mayathan words closely resembling those of the Chinese!"

"Aztec words," is the immediate correction.

"Roughly the same thing. The Aztecs or their forerunners, the Toltecs, migrated southward and mingled with the Mayas."

Churchward holds with neither of these theories. Although agreeing that there is admixture of Mongol blood, he says it is a recent happening — within the last few thousand years. To understand his belief as to Mayan cosmogony, we must go back to the beginning of the world . . .

According to his findings, supported by some of the most ancient stone tablets and documents in old and remote parts of the world, by the comparatively modern Troano MSS (Madrid), an ancient Maya book which dates back from 1500 to 5000 years, and also by the Book of the Dead, which he says was written as a memorial to those who perished in the great catastrophe which will presently be mentioned, Churchward submits that man did not have his genesis in the Euphrates Valley, the Biblical Garden of Eden. A Garden of Eden, it may have been, but it was

situated in the middle of what is now the Pacific Ocean, 3,000 by 5,000 miles of a glorious land lying between Hawaii and Easter and the Fiji Islands.

This was the great Motherland of Mu.

It was inhabited by 64,000,000 blond-white and brunette-white people, ably ruled and enjoying a culture quite as advanced if not more so than anything we know to-day. Mu had colonies and to them went, from time to time, skilled navigators. The land of the then-known world was quite familiar to them.

Mu existed right to the edge of historical times, some 12,000 years ago. Then, the second of two terrible earthquakes visited her. "The whole continent heaved and rolled like the ocean's waves . . . and as the land rose and fell, quivered and shook, the fires of the underneath burst forth . . . Cities and all things living went down before the flames . . . and as Mu sank into the fiery gulf, another force claimed her — fifty millions of square miles of water."

On a few tips of high land which were not submerged, groups of dazed people clustered. Many died of exposure. Many went mad and threw themselves into the sea. Many were eaten by those who were stronger (and thus was instituted the first rites of cannibalism) and the survivors made their way in passing ships to land. Says Churchward, "Now I shall follow ancient man around the world, and by the written records he has left behind in every country, I shall show beyond all peradventure the geographical position of Mu. I shall make the start from the United States of North America, because North America and eastern Asia were the two countries where man made his first settlements away from the Motherland."

If we put the approximate date of the flood at 12,000 years ago, then there must have been colonies already established in Yucatán when the survivors reached there, for several authorities give 15,000 years as the date of some of the present Maya ruins. Says Churchward;

" . . . every building that has carvings on it of the feathered serpent (Kukul Khan) is 15,000 or more years old. These buildings were erected during the Can (serpent) Dynasty. The Can Dynasty ended with Queen Moo. Queen Moo lived during the first century of Egyptian history."

Ancient records state that perhaps a thousand years after a white people came



*Interesting
example of two
periods of art.
The carved pillar
is Mayan. The
one behind is
Toltec.*

from the west, the great gas belt that lay beneath central America broke in the form of an earthquake and destroyed not only the Mayan cities but the builders of them. Evidences of this cataclysm are found in gravel, sand and in the earth that covers some of the ruins.

For a long period the country was unfit for habitation. Then new colonizers moved in, from which exact spot it is not known, but it is quite possible that they were a mixture of those people living for hundreds of thousands of years on the land, with those who drifted in from the colonies established in other parts of the world.

It would appear that Churchward is in agreement with the Asiatic migration theory insofar as it relates to recent times. Recent times cover the years beginning more or less with the Christian era. From this period, we are on surer ground, although we do not know why the people who called themselves Itza-Mayas and brought a monotheistic religion, a written language, skill in Art and Agriculture, in Science and Sport to Yucatán (and nowhere else in the world), we do not know why their date stones count time only from the eighth of their cycles. Where were they during the 3113 years of the other seven? No one has yet answered the question.

Progreso is Yucatán's chief port and is linked by twenty-four miles of excellent roadway to the Capital, Mérida. As the ancient Ti-Ho or City-of-the-Five-Temples-of-Heaven, it had 1,000 years of history behind it when the Spaniards came. They found only ruins but after subjugating the people, Montejo the Younger rebuilt the city using much of the old stone. For this reason, it has a mellow charm that is lacking in many places whose age is greater. Montejo's own house nearly 400 years old, still stands. Its plateresque facade is carved with his Coat-of-Arms and natives crouched under the conqueror's heel. The Museum is a fascinating repository of Mayan objects from great slabs of intricate carving, implements of peace and war, domestic utensils, jewelry, coffins and idols, from the *tunkul* or stone drum to bits of cloth, all that remained of the splendid ceremonial robes worn by the young girls—the fairest of the land—who were sacrificed to the Rain God, supposed to live at the bottom of the Great Cenote or Sacred Well.

Chichén-Itzá, the ancient capital of the powerful Maya Empire, was founded by one of the nation's two heroes, Itzamna. It was he who brought his people to this place, attracted probably by the great well, and to them he gave his name, Itzaes. He brought a religion that demanded subservience to one God, and for 1,000 years it was kept pure and undefiled. Old chronicles say that he gave a name to every object, that he instructed the Itzaes, and provided them with all they needed for a life of usefulness and culture. Later, he was deified and his image appears on most monuments and temples. His abnormally long nose has given rise to the theory that the Mayas were identified with the Jews. So far as I know, there is no support to this speculation. Itzamna had badly-deformed teeth, reminding us that filed teeth with crossed eyes (artificially achieved by hanging a small disc over the bridge of the nose), and artificially-flattened skulls were regarded as the highest form of beauty!

The other hero was the blond warrior Kukulcan. He is pictured with a beard—said to be red—almost as frequently as is the founder. Kukulcan came down from the north, Toltec country, 1,000 years after Itzamna, at a time when internecine wars threatened the dissolution of the Mayan Empire. He shrewdly and successfully drew the hostile elements into a Federation known as Mayapan and for a time it prospered. But Kukulcan also brought the Toltec idea of religion, which included the worship of idols and the making of human sacrifices. Although the Mayas never reached the murderous record of the northern people who were said to have sacrificed in Mexico City alone, from 20,000 to 40,000 people each year, they did their share as the sacrificial altars show.

Willard gives 987 A.D. as approximately the year the Mayas returned (no one knows how many times they may have returned previously) to the land of their ancestors. He fixes the coming of Kukulcan between 1007 and 1027 and gives a further date, 1087, as that in which the warrior-organizer seeing that his mission was finished, went away. According to some legends he, like Hiawatha, went to a self-imposed death . . . sailing out to the open sea.

Churchward says the Aztecs originally were a part of the Empire of Mayax (formed by the survivors of Mu) and that Kukul Khan, the feathered serpent, was

their symbol for the Deity. It is quite possible then, that the blond warrior—a Viking perhaps—who demonstrated such god-like qualities, was called after the ancient symbol appearing on so many of the buildings. This would permit the acceptance of Churchward's conviction that these monuments are thousands of years old, instead of hundreds and built only after the coming of the man, Kukulcan. Incidentally, he is always pictured with a plumed serpent close at hand.

The way to the Chichén Itzá Ruins from Mérida, follows in part the old Maya road, built sometimes 12 feet above ground level and polished with stones. Prior to the Spaniards' coming there were no horses. The road curves south east for 74 miles and never uncurves until the very end. A thin variety of jungle hems much of its length, the sun falling richly on the Indian laurel, the *ramón* whose leaves are used for cattle fodder, the eucalyptus, the *pom*, from which came the copal burned by the Mayas before their gods, the glowing *chacá* whose bronze trunk is used for making matches, the flaming *flamboyón*, a huge crimson umbrella, palms, cottonwood and many others. Where there is no jungle, *henequen* fields stretch to the horizon, and where there is neither, corn may find a hold among the stones. Some of the villages en route are merely a cluster of eight or ten palm-thatched huts, replicas of those built by the ancestors of these people.

Great red-headed *zopilotes* (buzzards) wheel insolently overhead. Boat-tailed grackle rush through the scorching air with tanagers, meadowlarks, vireos, mocking birds, orioles and a host of others. Later, the cry of the mourning dove, the whip-poor-will and the exquisite notes of the nightingale add joy to the soft starshine of the tropical night.

The only straight stretch of roadway lies at the end of the journey. Rounding a sudden curve, the eye seems to bump against the Great Pyramid, called "The Castle", and "Kukulcan", which blocks the vision. A hundred feet into the sky it soars, once having steps on its four sides, rising from nine terraces. Nine was the mystical number of the Mayas.

Ruins lie all about, not dreary piles of crumbling stone, but majestic buildings, silent, deserted yet suggesting a Force that has endured for hundreds of years and will continue to endure.

I stood in the shadow of the Great Pyramid wondering in just what spot Diego de Landa, Spain's second Bishop to the New World, had gathered 5,000 statues, 197 idol-decorated vases and 27 large manuscripts, beside thousands of books containing complete records of what had taken place in different epochs, as written by priests and other learned men, burning them in the presence of the conquered people. Some writers say the terrible bonfire was lighted at Mani, capital of one of the ancient territories.

The loss of these books means the loss of knowledge concerning the Maya people. Most of what history has been patched together, was written by Landa himself, and refers only to comparatively recent times. Fortunately, however, fragments of records escaped the burning and these as they are deciphered, will doubtless throw a great deal more light on the subject.

It is impossible even to mention the many beautiful buildings that have been uncovered and restored, but no article would be complete without a reference to Uxmal, to reach which one must return from Chichén Itzá to Mérida, then proceed fifty miles due south.

Here, the ruins are not so extensive but more richly decorated and purer in style. The important structures are The Dwarf's House, really a pyramid topped with a sort of residence, The Governor's House, the House of the Turtles, the Phallic Temple and the Nunnery, part of which was called by Le Plongeon, The Temple of Sacred Mysteries. On the wall he found this inscription, "This edifice is a memorial commemorating the destruction of Mu, the Lands of the West, whence came our sacred mysteries." Churchward found a cosmogonic diagram of man's first religion, supporting his theory that the building is 11,500 years old. Further, he points out that the door faces west, towards the Pacific, while in other sacred buildings lying on the west side of that body of water, altars, etc., all face eastward!

If this date is correct, and if as he says the principal Chichén Itzá buildings were constructed in the Can and the PPeu Dynasties, then most other theories as to the advent or evolution of man are exploded; and true or not, we have one of archeology's most absorbing puzzles.

*Chac-Moul,
the Fire God.*





One part of the market looks like this. Most of these are Maya women.



The volcan, the typical cart of the Yucatan Peninsula. Merely boards stretched between wheels, often 7 feet tall. They are drawn by mules or tiny horses, the descendants of those brought by the Spaniards who were limited both as to weight and to size in their small sailing ships.

This is the Mérida baker.



The numbers of people offering tiny quantities of beans, seeds, peanuts and other edibles is a feature of the Mérida market. Literally a handful of peas or a dozen peanuts will lie on the ground before the vendor who is the least aggressive vendor in the world.



Rules for Ball Players. It is said that the ancient seeing shooting stars, believed that the Gods were playing ball and evolved this rather bloody game on the basis of religious significance.

The Sacred Well at Chichén Itza, 160 feet in diameter, 70 feet below ground level and 50-70 feet deep. Here, after ceremonies in the city, young "brides" walked in a magnificent procession a quarter of a mile through the woods to a chapel on the edge of the pool. The last rites performed by the priest, the girls—said to have fought for the privileges—were swung by two men over the water and at a signal dropped into it. If they reappeared, they were saved and allowed to live; rejected by the Rain God. Not many were saved. Their clothes were too heavily weighted.





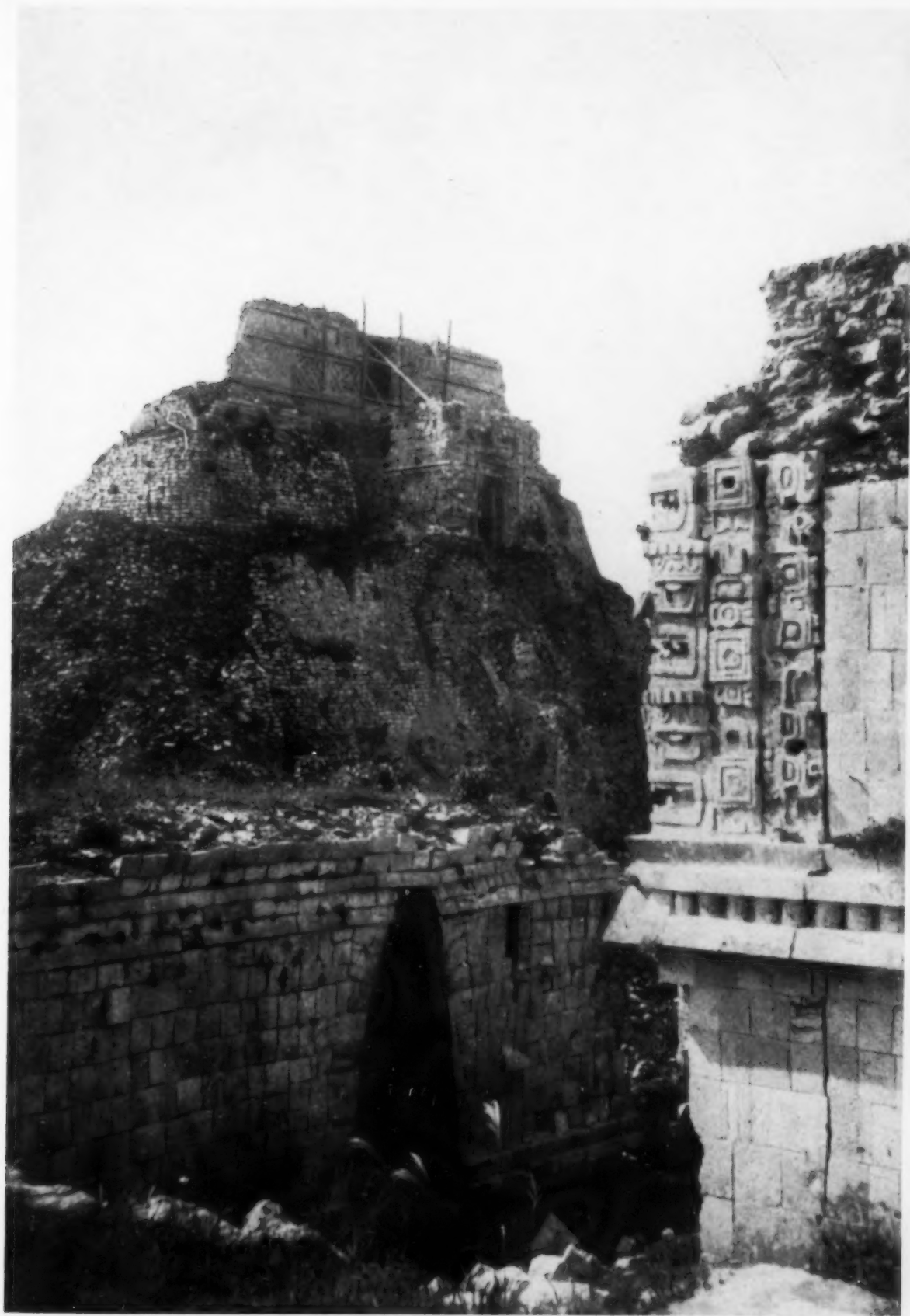
The typical Maya hut, built of small trees laced together, or mud, and thatched with palm. When repairs are necessary, a new stalk is thrust in among the old, thus giving a feathery appearance to the whole. One end of the hut is usually rounded. The floor is made of dirt and there is, beyond a box and a table, rarely any furniture. All members of the family sleep in hammocks the making of which provides work for hundreds of people. That this hut is a replica of those used hundreds of years ago is proven by the carving on one of the oldest Uxmal buildings.

A field of henequen locally called "green gold". About 7 years are required for a plant to mature. From 5 to 10 leaves are cut each season, and at an age varying from 25 to 35 years, the plant dies and its hijos (children) are used for making a new crop. Java and South Africa are the two other most extensive hemp-producing countries.





The typical Maya arch built like an inverted V and having no keystone, despite which it has endured for centuries. This specimen is found at Uxmal.



The Dwarf's House at Uxmal. Legend has it that the dwarf, hatched from an egg, overthrew Tutul Xiu and ruled the people with a conspicuous lack of wisdom. On the Governor's House there is a carving that shows the Dwarf coming out of his egg.



Detail showing the carved portrait of the Rain God, Itzamna. In so dry a land, no wonder he was venerated and propitiated with the loveliest maidens available. They were sacrificed to him in the Sacred Pool at Chichén Itzá.

The writer is not certain of identifying this building with the Temple of Sacred Mysteries in Uxmal. It was only partially uncovered when Churchward's photo was taken. But if not the same building, it was one very similar. As to the interior, no statement at the moment can be made, for excavators forbade anyone to enter.



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EDITOR'S NOTE BOOK

We desire to express our appreciation to those members who have consistently stood by the Society; to those several hundreds who have heartened us with encouraging comments when remitting membership dues, for the constructive criticism of those who have the welfare of the Society and its Journal at heart; to the Press whose consistent voluntary support in their editorial comments has been an inspiration.

We are, too, deeply indebted to those of the commercial interests, who through advertising and contributory support are making possible more vivid presentation of Canadian life, industries and background.

Several thousands of our members are presenting Membership in the Society as Christmas Gifts to friends at home and abroad. May we suggest that *every* member of the Society share in membership extension this Fall—by taking out one or more such memberships?

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Through the medium of the Journal, now published by the Society, we are endeavoring to promote Goodwill through graphic interpretation of Canadian life; our objective is Peace through understanding. Your further cooperation in effective promotion of the prescribed task will be deeply appreciated.

Readers may be interested in learning that our September issue has elicited hundreds of letters from all parts of the world commending text matter and pictorial presentation in this issue. Unfortunately, although over 10,000 extra copies were printed the demand exceeds the available supply.

Further issues of the Journal will contain illustrated articles on all new issues of Canadian postage stamps, and historical articles of Canadian stamps of special geographical significance. The interest displayed in articles pertaining to economic geography has encouraged the Editorial Committee to provide for a series of authoritative articles dealing with mining and other major industries.

The contents of the November issue will include an article by Sir James McBrien on his recent 11,000-mile inspection trip, and a timely contribution by Rodney Gallop on "The Basques"—the oldest people in Europe, now engaged in civil war. December issue will feature the Vimy Pilgrimage with about fifty full-page illustrations. The special Christmas number, an enlarged edition, will be available to nominees for Christmas Gift subscriptions—if received before *November 20th*.

NOTES ON CONTRIBUTORS

Mr. J. P. de Wet who contributes an article "Commercial Flying in Canada," in this issue, had been for some time on the staff of the Winnipeg Free Press. He is also contributing Editor for Western Canada for "Canadian Aviation." Mr. de Wet has specialized on aviation and has compiled an excellent clipping file on flying activities.

Don Munday who contributes an article in this issue is well known to readers of the Journal. New readers will be interested in learning that he is one of the two Canadian members of the International Glacier Commission.

Gordon S. Wrong is a native of Chatham, Ontario. He is a graduate in civil engineering from Queen's University and has had considerable railway experience in the Transportation Department of the Pere Marquette Railway at Detroit, Michigan. For the last seventeen years he has been Chief of the Transportation and Public Utilities Branch of the Dominion Bureau of Statistics at Ottawa and his literary activities have been confined almost entirely to the preparation of the many reports issued by this branch.

William Dougan was born at Ingersoll, Ontario, and entered the Government service in 1901. He has been connected with the collection and publication of statistics of the grain movement in Canada since their inception in 1909. Each year he prepares a detailed report on the Grain Trade of Canada that traces the various channels and markets through which grain passes from the farm to its final destination. He is, therefore, very familiar with all phases of this movement.

ERRATA—SEPTEMBER ISSUE

ERRATA:—"Canadian Geography and Stamps."

Pages 228, 232 and 233—for "Pictorial Issue of 1928" read "Pictorial Issue of 1930."

Page 234, 1st para.—delete the following sentence: "At either side is a Totem Pole of the Canadian Rockies."

Page 234, 8th para.—for "not generally considered equal to the 1930 series" read "not generally considered equal to the 1928 series," etc.

—"Canada's Nickel Industry".

Page 257, 1st para.—Quotation should read "Of making many books there is no end."

Pages 262 and 263 refer to preceding article by Richard Finnie.

Pages 265 (top picture) and 274—Titles should be transposed.

AMONGST THE NEW BOOKS

In an earlier number of the *Journal* the first two volumes were reviewed of *The Encyclopaedia of Canada*, edited by W. STEWART WALLACE with the assistance of a number of contributors (Toronto: University Associates of Canada.) Volume III of the *Encyclopaedia*, recently issued, maintains the same high standard that one had already learned to associate with this work of reference. Special articles that will be of particular interest to members of the Canadian Geographical Society are those on Geography by the late Principal W. L. Grant, on Geology by Professor A. P. Coleman, on Gold by Professor A. L. Parsons, on the Grain Trade by F. W. Burton, on the Grand Trunk Railway by Mrs. V. W. Bladen, on Harbours by H. A. Aiken, on the Hudson's Bay Company by Lawrence J. Burpee, on Indians by A. G. Bailey, on Domestic Industries by Colonel Wilfrid Bovey, and on Iron by Professor A. L. Parsons.

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BROCHE, GASTON E. *Pythéas le Massaliote, Découvreur de l'Extrême Occident et du Nord de l'Europe. Essai de synthèse par les textes.* (Paris: Société française d'imprimerie et de librairie ancienne Librairie Lecène, Oudin et Cie, 1936.) This brilliant study is of the most vital interest. Astronomer, physician, mathematician, cosmographer, Pythéas le Massaliote is an extraordinary person, who from the point of view of geographers should be as well known as Alexander or Christopher Columbus. In the fourth century, in a period between the years 332 and 312, he began, for the country which was to become France, the era of great discoveries. Leaving Massalia (Marseille), he passed the Pillars of Hercules, doubled the Cantabrian capes, followed the east coast of Great Britain, reached Thule and the Arctic Sea, returned to Cape Belerion (Lands End), explored the Baltic and discovered the "land of amber."

By the richness of its information, the sureness of its criticism, by its enthusiasm, this book recommends itself particularly to all those who have a passion for the past of Europe and the history of geography.

Translation of Jacques Fleury's review
in *La Géographie*.

How often when listening to a really good radio lecture one wishes to have it in printed form for one's own benefit and to share with those who could not listen-in. Last year DR. D. C. HARVEY, Archivist of Nova Scotia, delivered over the radio a series of addresses on the explorers, traders and immigrants, who opened up and settled the territories which now form the Dominion of Canada. These valuable lectures, which so interested his "unseen audience", have now been published under the title *Colonization of Canada*. (Toronto: Clarke, Irwin, 1936, \$1.25.)



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